FORESTERI

2006

OPERATION

SERVICE

SPARE PARTS

We,
KESLA OYJ
PL 282
80101 JOENSUU
FINLAND,

declare solely at our own risk that the following product:

Type: _____

_____

_____

_____

Serial number: _____

_____

_____

_____

is in conformity with the requirements and provisions of the following directives: Machinery Directive 89/392/EEC and directive 98/37/EU supplementing it, as well as Directive on Electromagnetic Compatibility 89/336/EEC, amended with directives 92/31/EEC and 93/68/EEC.

Before implementation of the product, the installation firm (fitter) shall affirm that the fitting conforms to to the requirements of the above directives as concerns fitting the product to a truck, tractor or other chassis and, in so far as the above is concerned, a new declaration of conformity must be made and a CE marking attached.

Name: ***Esko Paajanen***

Position: ***Managing Director***

Date: ***Joensuu*** _____

_____

_____

_____

_____

KESLA OYJ

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KESLA OYJ

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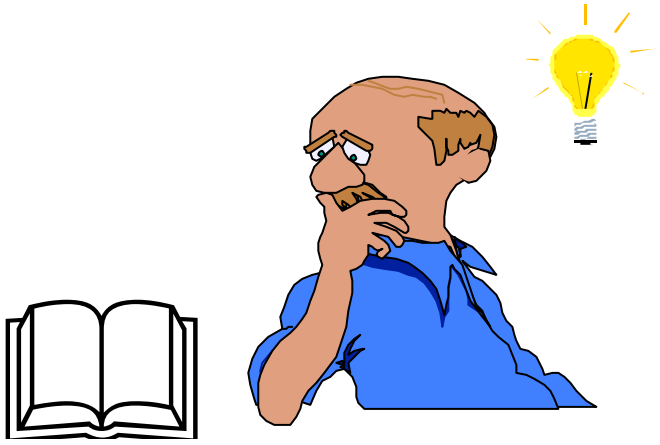
SUMMARY

1. As the very first step read the manual.
2. Check that the hydraulic system of the truck matches with the specification and the stability has been verified and is in accordance with regulations.
3. Follow the fitting instructions. The seller and the manufacturer will be pleased to give you further information, if needed.
4. Do not forget the inspections provided in law.
5. Always work with good judgement.
6. Do not forget to warm up the hydraulic system in freezing conditions.
7. Grease often with small amounts instead of infrequently with great amounts.
8. Cleanness is essential for the hydraulic system.
9. First filling oil: SHF 32, class API SD.
10. Repair even minor faults immediately to avoid serious damage.



FOR THE READER

Each Foresteri crane delivery includes an owner's manual. This particular manual is drawn up for operators with earlier practice of handling timber cranes.

**) The asterisk notifies information on the subject issue.*

-) The dash indicates necessary/possible steps to be taken.

safety — *The WARNING! symbol denotes a very important instruction.*

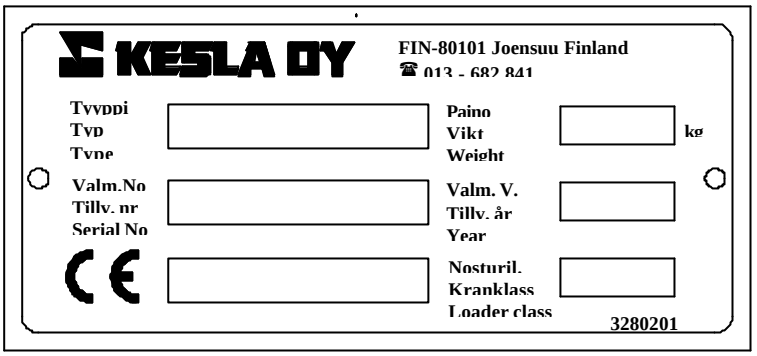
NOTE! product, process or environment — *The NOTE! symbol notifies risk of damage for the process or environment.*

** The content of the manual is divided into five larger sections headed in the upper right page corner. This together with page numbers will make the use of the manual quicker and easier.*

** All descriptions, instructions and technical data are based on the latest specification of the machine at the time of the manual. Due to continuous product development, the manufacturer reserves the right to change the product without advance notice.*

** In the case of disturbance in function , the problem and its probable cause can be repaired with the assistance of the fault finding chart. If not, contact the distributor or an authorised service centre.*

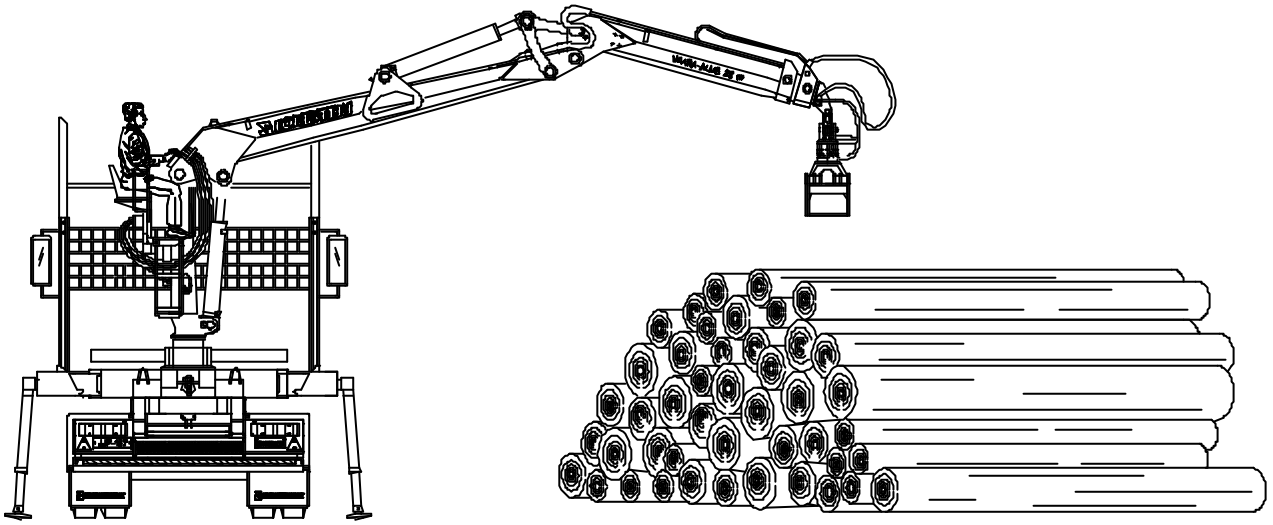
NOTE! When ordering spare parts or enquiring for service instructions, always supply the information from the machine plate. This will speed up the process and assure that correct information/parts will be supplied. Copy the information on the machine plate onto the picture below:


KESLA OY
FIN-80101 Joensuu Finland
☎ 013 - 682 841
Tyyppi
Typ
Type
Paino
Vikt
Weight
kg
Valm.No
Tillv. nr
Serial No
Valm. V.
Tillv. år
Year
Nosturil.
Kranklass
Loader class
3280201

CRANE PRESENTATION

FIELD OF APPLICATION

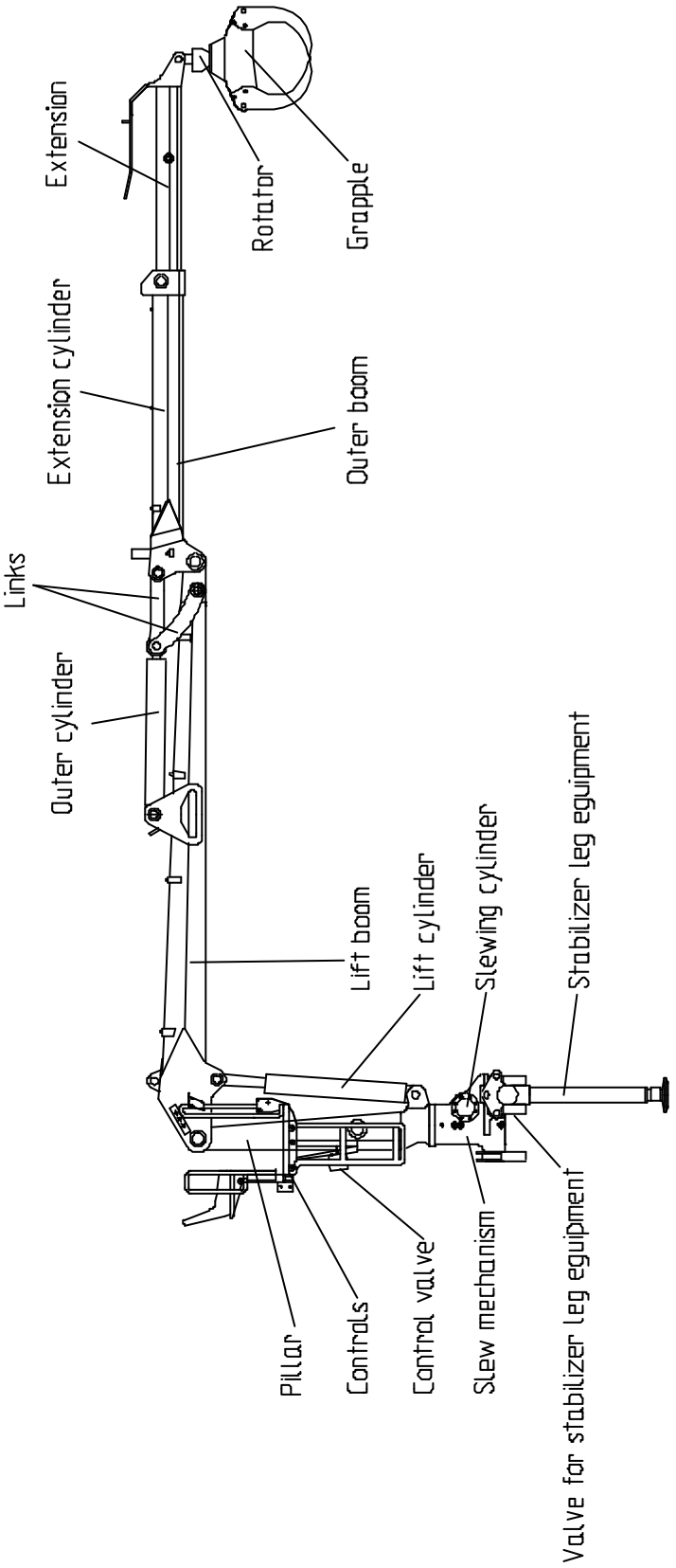
The Foresteri truck loader is designed for professional loading of cut-to-length timber. Do not ever use the crane for lifting persons!



OPERATING PRINCIPLE

To be in working order, the loader needs a power unit with attached hydraulic pump and necessary hydraulic equipment (among others oil reservoir, filter, hydraulic pipes). All working motions are hydraulic. Separate functions (slewing of booms, boom lifting, grapple closing etc.) are achieved by leading pressurised oil with the control valve to the desired hydraulic cylinders. If needed, the operator can drive several functions simultaneously.

MAIN LOADER COMPONENTS



INSTRUCTIONS AND WARNINGS ON CRANE

The loader has warning and instruction decals informing of hazards or operational directives. Follow these to avoid unnecessary accidents and malfunctions.

1. RISK ZONE DECAL
(Colour combination: yellow and black)

RISK ZONE 25 m

** A large decal on both sides of the outer boom, notifies the risk zone during operation.*
** Ensure that the risk zone is clear of unauthorised persons when operating the crane.*

2. WARNING DECAL
(Colour combination: yellow and black)

WARNING!
WARNUNG!

STAYING WITHIN THE DANGER ZONE IS STRICTLY FORBIDDEN WHEN THE LOADER IS IN OPERATION. KEEP CLEAR OF OVER HEAD POWER WIRES!

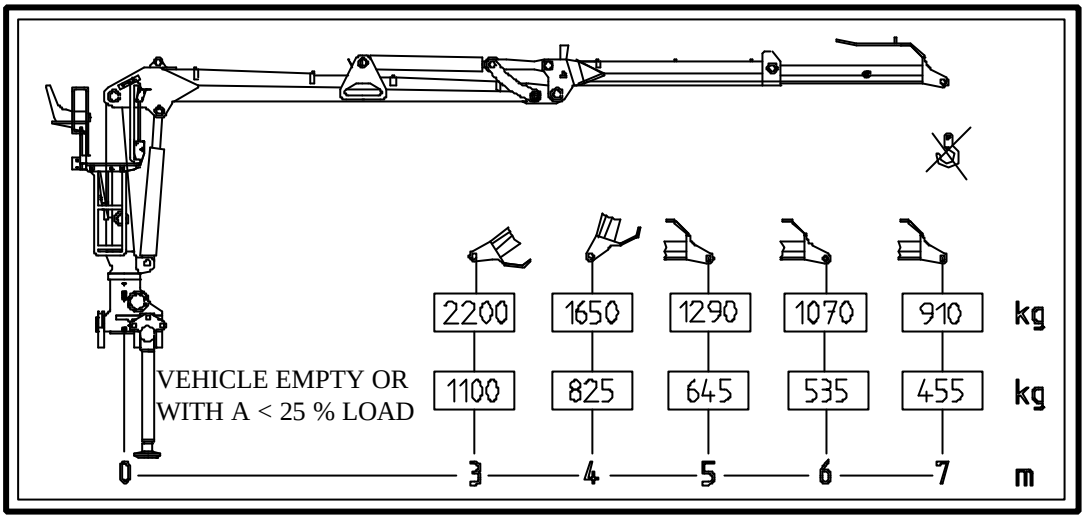
AUFENTHALT IM GEFAHRENBEREICH WÄHREND DES HEBEVORGANGS STRENGSTENS VERBOTEN! ACHTEN SIE AUF STROMFÜHRUNDE LEISTUNGEN

NOMINAL VOLTAGE NENNSPANNUNG U kV	MINIMUM DISTANCE FROM UNINSULATED WIRE MINDESTABSTAND VON NICHT ISOLIERTEN LEITUNGEN m	MINIMUM DISTANCE FROM INSULATED WIRE MINDESTABSTAND VON ISOLIERTEN LEITUNGEN m
U ≤ 1 1 < U ≤ 45 U ≥ 110	2 3 5	0.5 1.5

** The decal is delivered with the manual and shall be placed in front of the operator. The decal absolutely forbids persons loitering within the risk zone when the loader is working (risk zone 25 m).*

** The decal warns of live electrical conductors. If you must work or drive under such conductors, always follow the minimum safe approach distances given in the table.*

3. SAFE WORKING LOAD PLATE (Colour combination: yellow and black)

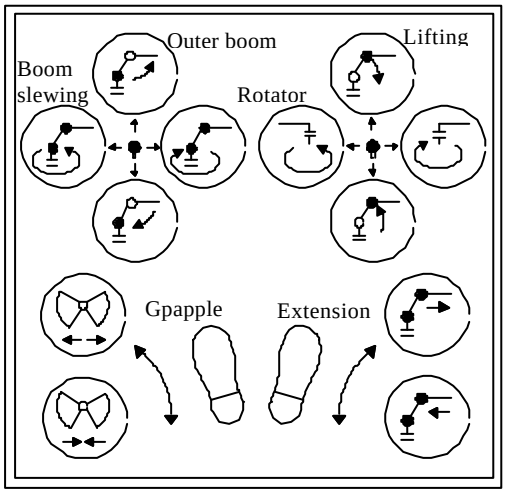


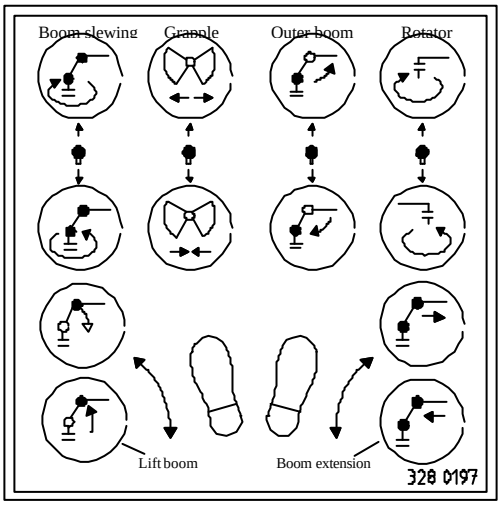
** The load plate is placed in front of the top seat and notifies the max. permissible loads for different lifting radii.*

** If the stability coefficient of a rear installed unit is 0,75...1,0, use 50 percent lowered lifting values when starting to load.*

4. CONTROL LEVER DECALS (Colour combination: yellow and black)

2 LEVER CONTROL VALVE: *4 LEVER CONTROL VALVE*



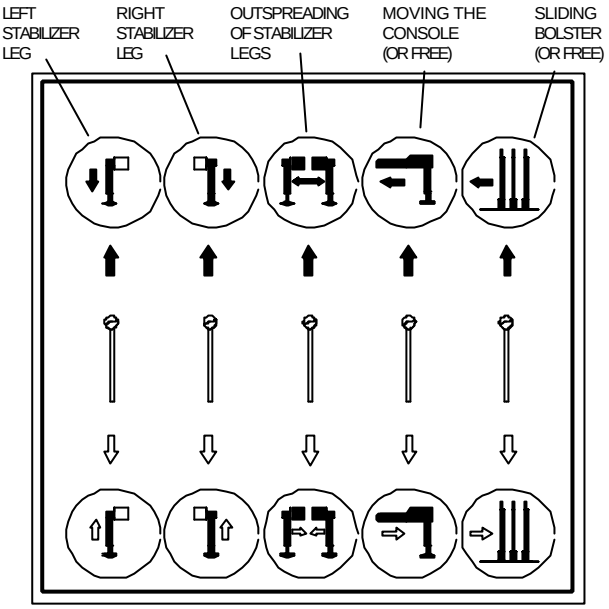


** The control lever decal is placed in front of the top seat and is, according to the control lever system, either for 2 or 4 levers.*

** The decal shows the lever and pedal functions.*

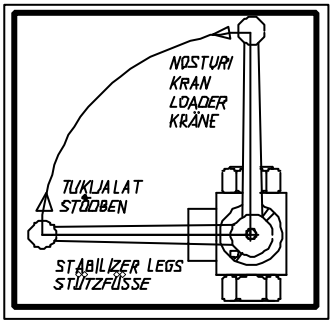
INSTRUCTIONS AND WARNINGS ON LOADER

5. STABILIZER CONTROL LEVER DECALS (Colour combination: yellow and black)



** There are 2 decals, one by the top seat, the other by the stabilizer control valve.*
** The stabilizer control valve can be controlled from the top seat electrically with switches or mechanically with levers and cables. It can also be controlled directly from the ground with valve levers.*
** The stabilizer leg control valve may have 3..5 functions depending on how the loader is mounted and the vehicle equipped. Examples: moving bolster in the trailer ➔ a 5 spindle valve for stabilizer leg control, fixed mounting without moving bolster ➔ a 3 spindle valve for stabilizer leg control.*

6. THREE-WAY GLOBE VALVE DECAL (Colour combination: yellow and black)

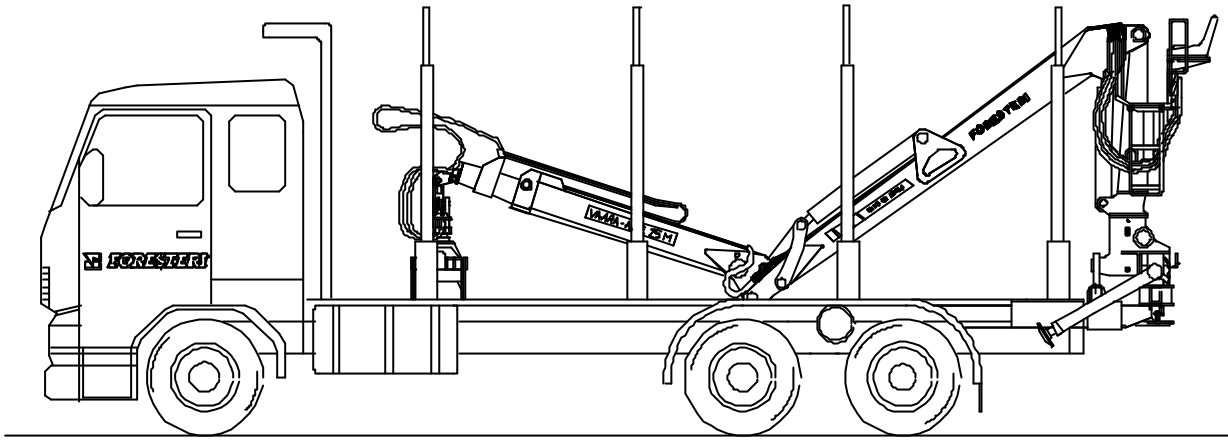


** The decal is located by the top seat, on the fixing plate of the right hand control valve.*
** The pressurised oil is guided with the three-way valve either to the control valve or to the stabilizer leg valve.*

** If the oil is guided to the control valve, the stabilizer leg control valve does not function.*

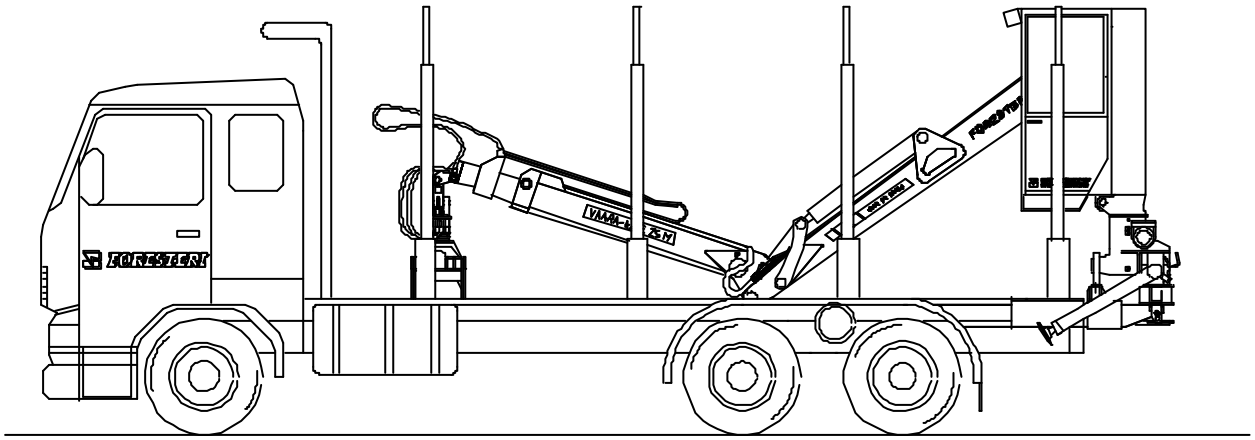
STANDARD MODELS AND ACCESSORIES

- Standard loader



** The controls can be installed directly behind the pillar, or, by using wedges, slightly to the right or left so that the boom will not obstruct the operator's view.*
** The control valves are delivered with either 2 or 4 levers plus 2 pedals, customer's option.*
** The valve for stabilizer leg control is delivered, depending on the functions needed, with 3...5 spindles (e.g. moving bolster detachable fitting console etc.). It can be either electrically or mechanically controlled from the top seat.*
** Outer boom alternatives: single or double extension.*
** Hydraulic system alternatives: for single pump or for twin 2 pumps. The system can be also made for a variable displacement pump.*

- Loader with a cab



** The crane cab is fitted to guide posts on the left hand side of the pillar. The crane cab is moved hydraulically up and down.*

STANDARD MODELS AND ACCESSORIES

* Loader controls are placed in the crane cab. The control valves are controlled either mechanically (with levers connected straight to the spindles) or electrically.

* The alternative accessories of the loader are the same as for standard loaders.

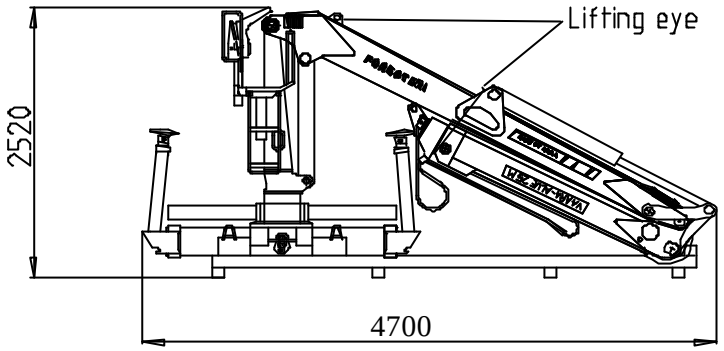
* As standard the crane cab is equipped with e.g. heater, 2 wind-screen wipers / washers, inner light, working light set of 5, seat + arms, safety glass wind-screen and a safety glass sun roof.

Accessories:

* Timber grapple	(e.g. Foresteri 28/36, Hultdins SG 260,...)
* Rotator + link set	(e.g. Indexator GV11-2, MR8AF...)
* Working light set	(2, 4, or 5 working lights)
* Heated seat	
* Raised seat back	
* Central lubrication system	(e.g. Safematic)
* Weighing system	(e.g. KA-60)
* Detachable fitting console	
*.Transfer cylinder for console	
* etc.	

PREPARATIONS BEFORE INSTALLATION

** The Foresteri truck loaders are delivered from the factory as complete units with control valves, pressure filters and hydraulic lines as well as other hydraulic fittings. Grapple, rotator etc. are delivered as accessories.*



** The transport base is made of 100x100 mm timber and can be reused or burned.*

** For handling the loader a lifting capacity of min. 29 kN (3000 kg) is needed. A fork lift can be used for lifting it from under the transport base (ALERT ! danger of tipping over).*

** Lift the loader from its transport base to the mounting place and remove there all the transport fastenings and bindings.*

** The visible cylinder piston rods are protected against corrosion. Clean off the protective grease (using e.g. kerosene), because impurities can damage the seals.*

** Do not install the loader unless necessary components, like hydraulic pump/ pumps, oil tank and hydraulic pipes first are installed on the truck.*

** ALERT ! Always check that the hydraulic system of the truck suites the loader.*

** When fitting the sub frame and the fitting base for the crane follow the instructions of the truck manufacturer / dealer.*

** Before mounting the loader check the stability of the machine unit by calculation. (refer to Instructions for determination of stability by calculation - loader cranes).*

FITTING THE LOADER

Only a service centre or person authorised by the manufacturer is permitted to perform the fitting.

** All loader functions have been test run and hydraulic pressures measured by the manufacturer. First filling oil SHF 32 (class API SD).*

** The service centre shall affix to the vehicle a machine plate, where following information is given:*

– *name and address of service centre, year of mounting, serial number of loader, registration number of vehicle and CE marking.*

** The loader can be fitted at the back of the truck, behind the cab or front, centre or back of a semi trailer.*

1. MOUNTING IN THE BACK OF THE VEHICLE ON A DETACHABLE CONSOLE

** Fit the truck with the sleeves (2) for console (3) mounting.*
- follow the instructions of the truck manufacturer/importer.

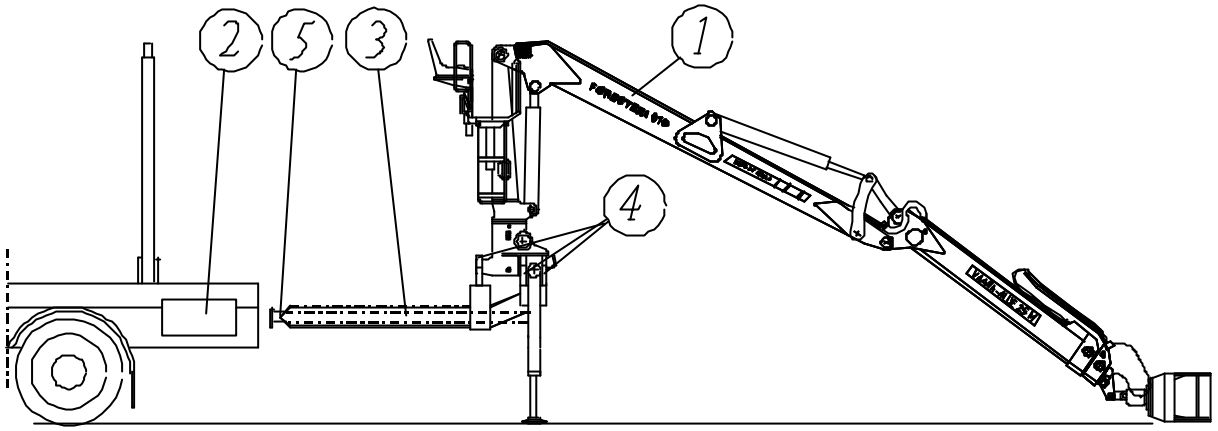
** Lift the rear installation console (3) into the sleeves (2).*

** The detachable console is normally fitted with a transfer cylinder (5). A slotted pocket where the flange of the transfer cylinder rod engages to must be attached to the truck frame. As an alternative the transfer cylinder can be fitted to the truck frame and the pocket to the detachable console.*

** Lift the loader (1) on the console (3) and place the studs M30 (4) 6 pcs in the outer holes of the console as illustrated in the base drawing page 11. Tighten the studs equally with a torque wrench to torque of 1200 Nm (122 kpm).*

ALERT ! A safety chain must be fitted between the truck frame and the console to prevent the loader from falling off.

FITTING THE LOADER

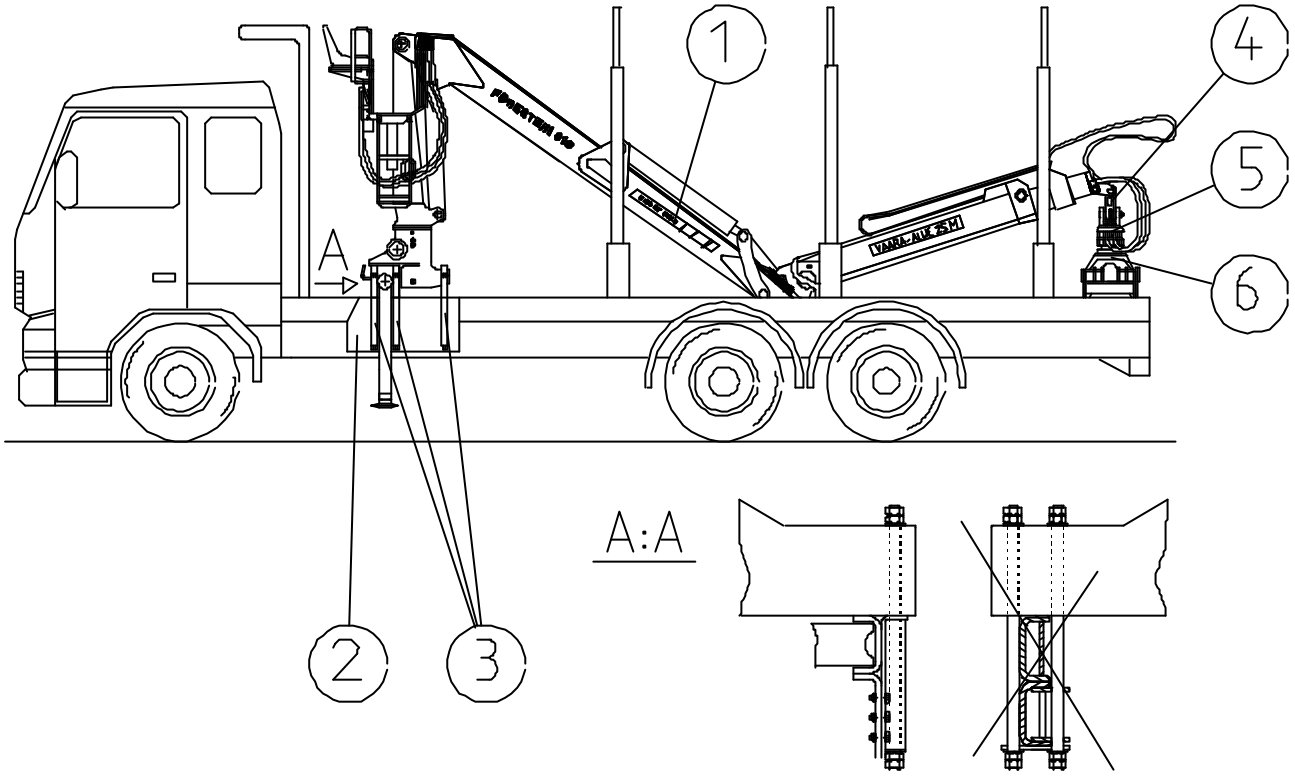


** Connect the return and pressure hoses of the loader to the hydraulic system of the truck. If needed, replace the quick couplings of the truck.*

** Also a fixed mounting of the loader behind the truck is possible (refer to item 2).*

FITTING THE LOADER

2. FITTING THE LOADER BEHIND THE CAB



** Fit 10 mm steel plate with screws (2) to the sides of the auxiliary frame/chassis of the truck. Sheaths for the studs M30 (3) are welded on the plates.*

- *Follow the mounting instructions of the truck manufacturer/dealer.*
- *The truck manufacturers do not recommend either clamp mounting, that presses the frame members, or welding directly on the frame members.*

** Lift the loader (1) onto the fixing plates (2) (ALERT! do not let rest on frame members) and put the studs M30 (3), 6 pcs in the sheaths. Tighten the studs equally with a torque wrench to torque. 1200 Nm (122 kpm).*

** Mount the accessories: link (4), rotator (5), grapple (6) + hydraulic hoses, if not done by the loader supplier.*

** Connect the return and pressure hoses of the loader to the hydraulic system of the truck.*

FITTING AND COMMISSIONING

FITTING THE LOADER

Please note that the slewing arc of the crane is 415 º. If not differently specified when the order was placed, the centre position is on the outrigger side of the pillar and the boom stops are on the pendulum side.

The loader may be fitted, depending on the make and model of the truck, with the pendulum (and the boom steps) towards the cab (as illustrated on the previous page) or with the pendulum facing the rear of the truck.

In the latter case you may wish to change the centre of the slewing arc to be the pendulum side. To do this, you must remove the two slewing cylinders and remove the piston from one side of the rack. Then you must turn the crane pillar until the rack can be pulled out from the other side, 1.e. the teeth are disengaged from the king post pinion.

Turn the crane pillar through 180 º to the new end position of the slewing arc. Then re-mesh the rack with the king post pinion, making sure that the rack support head is correctly in its place, and all of the removed parts are put back in place.

INSTALLATION OF THE LOADER ON A TRAILER

If the loader is fitted on a semi- trailer, it is basically done in the same manner as described earlier, installation on a truck. If the loader is fitted in the back or in the centre of the trailer, the frame must be reinforced if not done by the manufacturer of the trailer, and the support legs must be given enough space to be tilted to the position.

Should the loader be fitted in front of the trailer, the crane will be sitting just above the rear wheels of the truck. In addition to what has been said of reinforcing the frame of the trailer, you may want to change the slewing arc as described above, and you may also have to make the support legs swing up earlier and higher than in other installations, to avoid touching the rear wheels of the truck. There is a set of exchange parts available from the loader manufacturer. See also ”Dismantling the slew mechanism”.

ALERT! The start-up inspection shall be carried out at this stage.

3. CONNECTING THE EMERGENCY STOP BUTTON

** The hydraulic system of the truck must be fitted with an electrical valve between the pressure and return lines. Please note that the valve must be strong enough to work at 250 bar pressure and wide enough to pass a flow of 70 l/min for each pump circuit.*

** The alternative method of connecting the emergency stop is to use the electric engine stop circuit. The truck supplier can provide the additional components needed.*

INSPECTIONS

The start-up and periodical inspections shall be carried out by a person with sufficient knowledge of loader design, operation and inspection. Please refer to national safety regulations as to the qualifications of the inspector.

Record files:
Record forms for start-up and periodical inspections are supplied with the user manual. During every inspection such a form must be filled out and stored with the loader. Please refer to the national regulations.

1. START- UP INSPECTION
The inspection shall be carried out immediately after installation, before taking the loader in use. The procedure is given in the record of start-up inspection (enclosure 1) consisting of the determination of stability of the machine unit according to Finnish standard SFS 4677 and operational test according to Finnish standard SFS 4261.

2. WARRANTY SERVICE
This service shall be performed by an authorised service shop according to the warranty service records (enclosure 2). For the warranty to apply in full, the service must be carried out within 30 days of mounting the loader.

3. PERIODICAL INSPECTIONS
An operating loader must be inspected within a period of one year and also tested according to the Finnish standard SFS 4261 every 4 years (Please refer to the national regulations as they may rule differently. The

inspection procedure is given in the record for periodical inspection (enclosure 3). During the inspection special attention must be paid to fatigue of material, wear, corrosion and other damage caused by operation. No structural changes are allowed, especially from the safety point of view.

4. DAILY OVERHAUL PRIOR TO OPERATION

** Check the oil quantity of the hydraulic system and the slew mechanism and add, if needed.*
** Lubricate the loader, if necessary (refer to Maintenance procedures).*
** Make a visual inspection of the loader's fitting screws, pin lockings, hoses and any possible leakage.*
** Check the functions of controls and the safety equipment by driving the functions to their limits and repair possible faults and defects immediately.*
** Check that the emergency stop switch works.*

INSTRUCTIONS FOR DETERMINATION OF STABILITY BY CALCULATION - LOADER CRANES

* The stability must be determined in connection with the start-up inspection and performed e.g. by an authorised service centre.

ALERT ! Determination by calculation is not necessary, if the stability is determined by test. Also when the calculated stability is < 1.0 the determination by test shall be carried out.

The formulas and calculation are based on the Finnish standard SFS 4677. Please refer to national regulations as they may differ.

* The loader is considered stable, when the sum of the tipping moments multiplied with the stability coefficient does not exceed the sum of the stabilising moments.
* The loader is set under a static load on a horizontal plane in a position most unfavourable in relation to the tipping line. The vehicle must be empty.
* The stability coefficient for a loader mounted behind the cab shall be ³ 1.4 and for a loader mounted in the back of the chassis ³ 1.0. If the calculated coefficient is n<1, the stability must be examined by test.
* If the coefficient n = 0.75...1.0, 25 % of max. permitted effective load can be added when calculating stability of a loader mounted behind the chassis. This load is added to the axle/ bogie weight. In this case the safe working indicate also load plate shall indicate 50 % load values and the text: Vehicle empty or a < 25 % load.
* Following points are used as points of vertical intersection of the tipping lines. Centre points of the stabiliser legs, centre of wheels, centre of wheel pairs, centre of front axle on a vehicle mounted loader, mounted behind the chassis.
* Weights and dimensions for deterring the stability by calculation depend on the male and model of the vehicle. Therefore the determination of the stability must be done case by case, depending on the make and model of the vehicle, the way of loader installation and the loader model, based on real (measured or calculated) dimensions and weights.
* For weight and dimensions, which cannot be found in the vehicle's service manual/ registration documents, , please contact the nearest

dealer or importer of the vehicle. The same for the loader can be obtained from the nearest Foresteri dealer.

INSTRUCTIONS FOR DETERMINATION OF STABILITY BY CALCULATION - LOADER CRANES

Calculation formula (standard formula for all mounting alternatives):

$$\frac{M_1 \cdot D + N \cdot A + M_2 \cdot C + M_3 \cdot C' \ ^3 \ n}{G \cdot B + P \cdot E}$$

Formula keys:
A = Distance from slewing centre of loader to tipping
-by measuring or calculation
B = Distance from suspended load (tip of the boom) to tipping line
-by measuring or calculation
C = Distance from rear axle centre to tipping line
-by measuring or calculation (measure information from vehicle)
C' = Distance from rear front axle centre (with 4 axles) to tipping line
-by measuring or calculation (measure information from vehicle)
D = Distance from front axle centre to tipping line
-by measuring or calculation (measure information from vehicle)
E = Distance from centre of gravity of the boom assembly to tipping line
-by measuring or calculation
G = Max. load with max. reach
-from safe working load plate
N = Mass of loader base stabilisers and pillar and detachable console (i.e. boom assembly excluded)
-from loader manufacturer or dealer
P = Mass of boom assembly (at centre of gravity)
- from loader manufacturer or dealer
M_1 = Front axle weight without payload
-information from vehicle's manual
M_2 = Rear axle weight without payload
-information from vehicle's manual
M_3 = Rear front axle weight without payload (vehicle with 4 axles)
-information from vehicle's manual
n = Stability coefficient
a = Angle between centre line of vehicle and tipping line
-to be calculated from the measured information

Different crane/vehicle units with their calculation formulas are given on the next pages.

INSTRUCTIONS FOR DETERMINATION OF STABILITY BY CALCULATION - LOADER CRANES

***1**. A vehicle with 2 or 3 axles, with the crane mounted behind the cab.*
- the stability coefficient shall (according to SFS 4677) be ³ 14
- the stability coefficient is calculated with formula

$$\frac{M_1 \cdot D + N \cdot A + M_2 \cdot C}{G \cdot B + P \cdot E}$$

- If the result is ³ 1.4, the crane is considered stable.

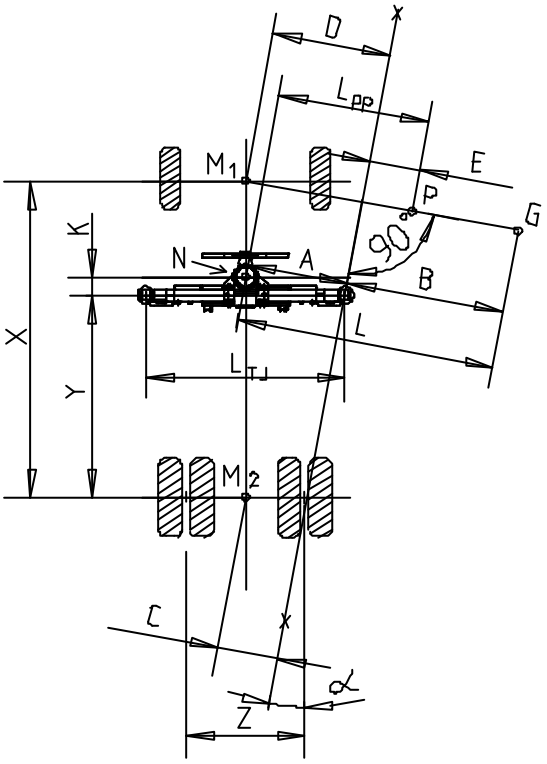


FIGURE 1

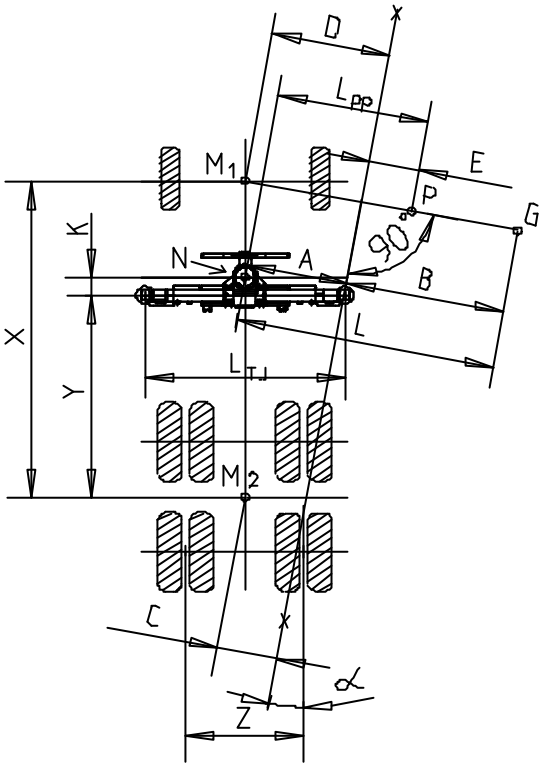


FIGURE 2

INSTRUCTIONS FOR DETERMINATION OF STABILITY BY CALCULATION - LOADER CRANES

1. CRANE MOUNTED BEHIND THE CAB (pict. 1 and 2)

Vehicle information needed for calculation:

M_1 = front axle weight less load _____ kg

M_2 = rear axle weight less load _____ kg

X = wheel base _____ mm

Y = distance from rear axle to crane stabiliser legs _____ mm

Z = distance between centre of rear wheels (track gauge) _____ mm

Manufacturer's information on Foresteri cranes:

N = crane weight less booms _____ kg

P = weight of booms _____ kg

G = load with max. reach _____ kg

L = max. reach from slewing centre _____ mm

L_{PP} = distance between centre of gravity of booms and slewing centre _____ mm

L_{TJ} = support width of stabiliser legs from slewing centre _____ mm

K = slewing centre distance from stabiliser legs _____ mm

The angle a (the angle between the centre line of the vehicle and the tipping over verge) and the coefficients A, B, C, D and E of the calculation formula are calculated on the basis of the above data. A scientific calculator is needed for the calculation.

$a = \arctan \frac{L_{TJ} - Z}{2 \cdot Y} =$ _____ °

$A = K \cdot \sin a + \frac{L_{TJ}}{2} \cdot \cos a =$ _____ mm

$B = L - A =$ _____ mm

$C = \frac{Z}{2} \cdot \cos a =$ _____ mm

$D = X \cdot \sin a + \frac{Z}{2} \cdot \cos a =$ _____ mm

2

$E = L_{PP} - A =$ _____ *mm*

Place the resulted numerical values into the formula

$$\frac{M_1 \cdot D + N \cdot A + M_2 \cdot C}{G \cdot B + P \cdot E} =$$

The crane is considered stable, if the result is ³ 1,4

INSTRUCTIONS FOR THE DETERMINATION OF STABILITY BY CALCULATION - LOADER CRANES

2. *A vehicle with 2 or 3 axles, with the crane mounted in the back of the chassis. (D=0)*

- the stability coefficient shall (according to SFS 4677) be ³ 1,0

- the stability coefficient is calculated with formula

$$\frac{N \cdot A + M_2 \cdot C + M_3 \cdot C'}{G \cdot B + P \cdot E}$$

- If the result is ³ 1,0, the crane is considered stable

- If the result is 0,75...1,0, the stability must be examined by test.

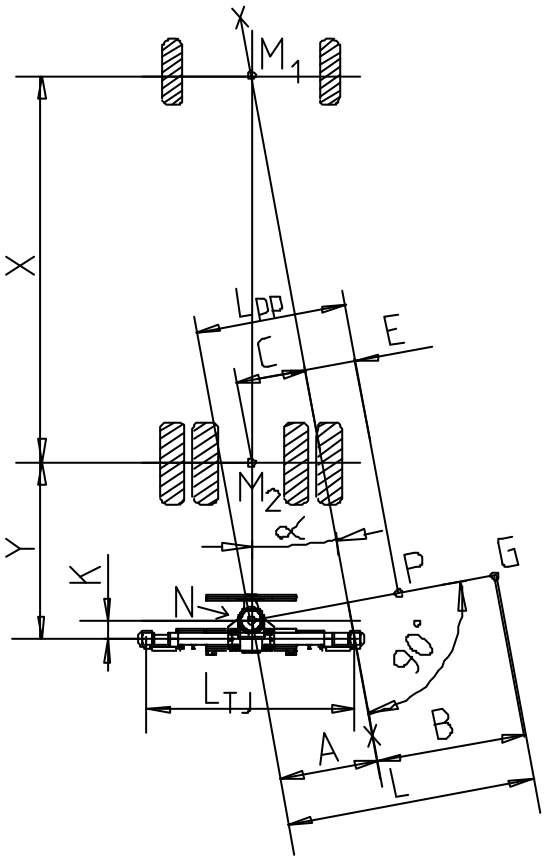


FIGURE 3

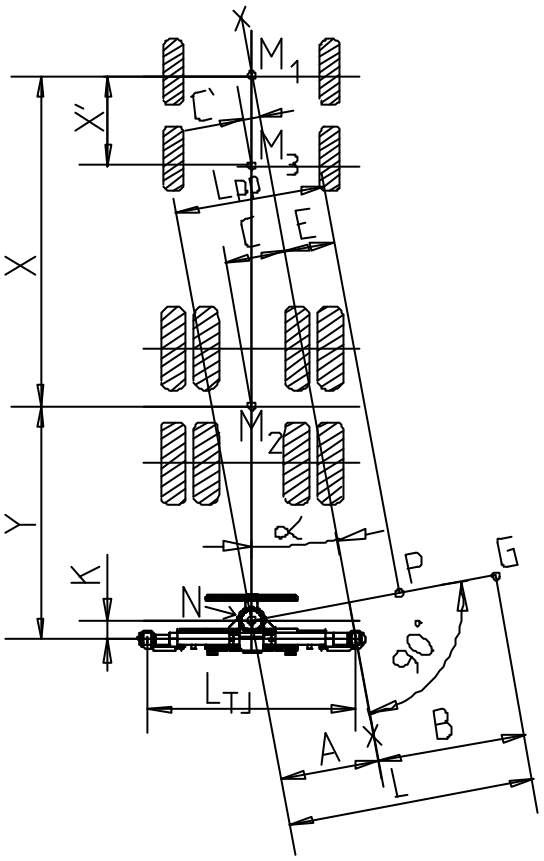


FIGURE 4

INSTRUCTIONS FOR THE DETERMINATION OF STABILITY BY CALCULATION - LOADER CRANES

2. A CRANE MOUNTED BEHIND THE VEHICLE (pict. 3 and 4)

Vehicle information needed for calculation:

M_2= rear axle weight less load _____ kg
M_3= rearmost front axle weight less load _____ kg
(M_3 = 0 if there is no axle)
X= wheel base _____ mm
X´= front wheel base _____ mm
Y= distance from rear axle to crane stabiliser legs _____ mm

Manufacturer's information on Foresteri cranes:

N = crane weight less booms _____ kg
P = weight of booms _____ kg
G = load with max. reach _____ kg
L = max. reach from slewing centre _____ mm
L_{PP} = distance between centre of gravity of booms and slewing centre _____ mm
L_{TJ} = support width of stabiliser legs from slewing centre _____ mm
K = slewing centre distance from stabiliser legs _____ mm

The angle a (the angle between the centre line of the vehicle and the tipping over verge) and the coefficients A, B, C, D and E of the calculation formula are calculated on the basis of the above data. A scientific calculator is needed for the calculation.

$$a = \arctan \frac{0{,}5 \cdot LTJ}{X + Y} = _____ °$$

$A = (X + Y - K) \cdot \sin a =$ _____ mm

$B = L - A =$ _____ mm

$C = X \cdot \sin a =$ _____ mm

$C' = X' \cdot \sin a =$ _____ mm

$E = LPP - A =$ _____ mm

Place the resulted numerical values into the formula

$$\frac{N \cdot A + M2 \cdot C + M3 \cdot C'}{G \cdot B + P \cdot E} = _____$$

If the result is 0,75...1,0, the stability must be examined by test

Installation company	*Date*	*Signature*

INSTRUCTIONS FOR THE DETERMINATION OF STABILITY BY CALCULATION - LOADER CRANES

CALCULATION EXAMPLE:

PATU 2006 FORESTERI , loader mounted on a console behind a 3-axle vehicle.

M_2 = 6500 kg bogie weight less load
X = 5500 mm distance between bogie and front axle
Y = 3300 mm the loader stabiliser legs' distance from the centre of the console

Manufacturer's information on Patu 2006 Foresteri loader:

N = 1080 kg loader weight less booms
P = 510 kg weight of booms
G =910 kg load with max. reach
L = 7000 mm max. reach from slewing centre
L_{PP} = 2450 mm distance between centre of gravity of booms and slewing centre
L_{TJ} = 3085 mm support width of stabiliser legs from slewing centre
K = 198 mm slewing centre distance from stabiliser legs

$$n = \frac{N \cdot A + M_2 \cdot C + M_3 \cdot C'}{G \cdot B + P \cdot E}$$ calculation formula (M_3=0)

$$\alpha = \arctan \frac{0{,}5 \cdot L_{TJ}}{X + Y} = \arctan \frac{0{,}5 \cdot 3085}{5500 + 3300} = 9.9°$$

$A = (X+Y-K) \cdot \sin \alpha = (5500+3300-198) \cdot \sin 9.9° = 1479$ mm

$B = L - A = 7000 - 1479 = 5521$ mm

$C = X \cdot \sin \alpha = 5500 \cdot \sin 9.9° = 946$ mm

$E = L_{PP} - A = 2450 - 1479 = 971$ mm

$$n = \frac{1080 \cdot 1479 + 6500 \cdot 946}{910 \cdot 5521 + 510 \cdot 971} = 1.40$$

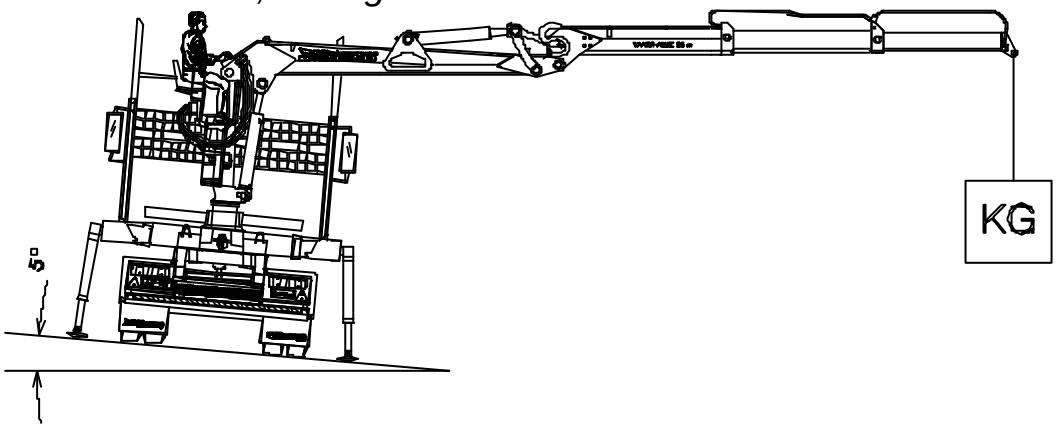
n > 1,0, the crane is considered stable.

INSTRUCTIONS FOR THE DETERMINATION OF STABILITY BY TEST - LOADER CRANES

Safety instruction
** Observe extreme caution when testing, danger of tipping over!*
** Make sure that all loader cylinders are vented before the test. Sudden movements!*
** Make sure that the ground is firm enough to withstand the loads of the wheels and other points of support.*

TEST CONDITIONS
** During the test the vehicle shall be in normal running order less load.*
** Remove the accessories or weigh them as a part of the test load according to the table.*
** Incline the vehicle 5° in the direction of the tipping over line during the test.*

PERFORMING THE TEST
** The test is carried out with the most unfavourable reach in regard to the stability and using an overload of 10 %.*
** Observe extreme caution when driving all the movements, as normally driven with the loader, during the test.*



The loader is considered stable, if no more than one of the loader's points of support looses its contact from the ground during the test.

If more than one point of support looses its contact, put a load of 25 % of the max. permissible load in the load area and repeat the test.

In this case, the halved lifting values and the text: "Vehicle empty or with a <25% load" are to be added on the load plate.

Stability determined by the installation firm:

Installation firm _____

Date _____

Signature _____

OPERATION AND SAFETY INSTRUCTIONS

Do not ever run the loader unless the operator is familiar with the operation and safety instructions!

** Always have the parking brakes engaged when loading. If needed, place parking blocks in front of the wheels.*
** Check the safety chain when mounting the rear installation console.*
** The oil is guided by the three-way globe valve to the loader's control valve or to the stabiliser leg valve. The stabiliser legs are controlled with the valve fixed on the base or with remote control from the top seat.*
** Spread out the stabiliser legs as wide as possible to achieve good stability. If not possible, start loading with smaller loads.*
** Ensure stabiliser legs are on a firm ground. Use extra plates, if needed.*
** The pilot pressure operated check valves hold the stabiliser legs up even in case of overload or hose burst. If need be, the stabiliser legs can be locked with a pin to prevent them from folding. (E.g. when detaching the loader mounted on a removable console from rear end of the truck onto its stabiliser legs). Pin locking is usually not needed during work.*
** Note that the greatest part of the increasing load is taken by the stabiliser legs, because the springs of the truck are compensated by the stabiliser legs. Therefore we recommend to relieve the stabiliser legs when about half way trough the loading, thus shifting the weight to the truck wheels.*
** Avoid loading on an inclined ground. If not possible observe extreme caution and lift only smaller loads. When loading from the uphill side of the vehicle, remember that the relief valve of the slewing cylinders can be overloaded, causing the load to run away in the downhill direction and leading to a dangerous situation.*
** The stability of the machine unit is at its weakest when the load area is empty. Lower the load immediately to the ground, if the unit starts to tip over. Do not drop the load by opening the grapple.*
** Ensure that the work area of the loader is clear of persons and that you have an unobstructed view over the whole area.*
** Never lift a load above people.*
** Take a firm grip of the load and always as close to the centre of gravity as possible. Do not exceed the max. loads given in the load table.*
** Do not lift the load with the maximum reach of the telescopic boom. Instead pull the load closer with extension boom and then lift.*

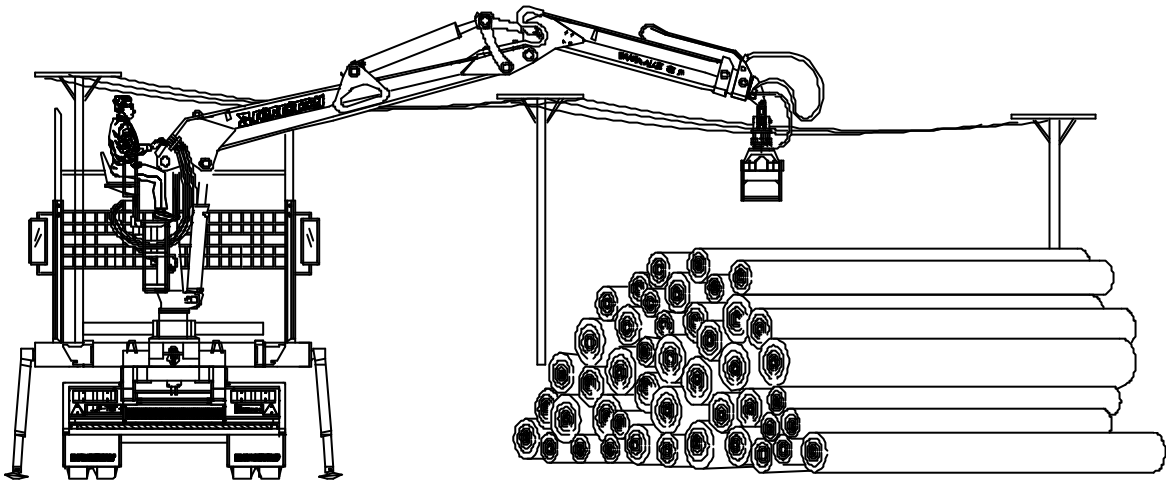
OPERATION

OPERATING AND SAFETY INSTRUCTIONS

** Avoid quick lifting and lowering movements with fully outstreched boom, also swinging movements before the load is in the air.*

** Never drive the booms to their limits with great speed.*

** Observe extreme caution when working close to electric lines. Make the safety distances to electric lines clear to yourself and follow them (Refer to WARNING decal).* ***Minimum safe approach distance to electric line: 5 m, if voltage > 110 kV.***



** Never leave the booms hanging above ground without supervision!*

** After having completed the loading, lower the loader firmly against a rest and disconnect the pump before starting to drive.*

** Observe extreme caution when mounting or dismounting the loader to or from the vehicle's back. Danger of tipping over!*
- Prevent the stabiliser legs from folding with pin locking.
- Support the booms firmly on the ground.
- Make sure the ground is firm and even.
- Ensure that the risk zone is clear of any unauthorised person.

** No additional extensions shall be mounted onto the loader without the manufacturer's permission.*

** Never use a faulty loader.*

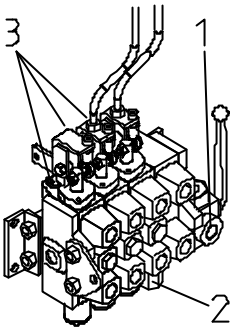
** Never use the loader for towing.*

** Never use the loader for lifting persons.*

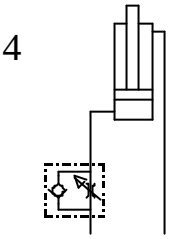
OPERATION

SAFETY EQUIPMENT

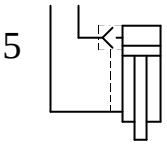
** For safety at work the loader hydraulics are fitted with different chock valves.*
** The valve settings may not be altered without the manufacturer's written permission. The manufacturer will not be responsible for any damage, if the pressure and flow settings have been altered without permission.*
** The truck's pressure lines(s) should have relief valves fitted with an opening pressure exceeding the loader's main relief valve with at least twenty (20) bar.*



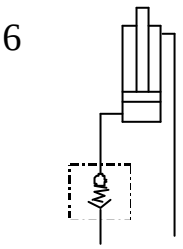
1. *The three-way globe valve is located in the pressure connection of the right side control valve and leads the pressurised oil, either to the control valve or the stabiliser leg valve. This prevents the unintentional use of the stabiliser leg valve during loading.*



2*. The main relief valve prevents the working pressure from rising too high and is located at the inlet section of each control valve. If the pressurised oil coming to the control valve is exceeding the pressure settings, the oil will flow through the return channel to the oil tank until it has reached the set pressure.*

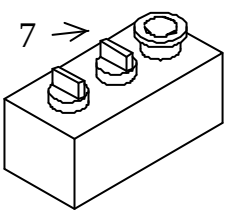


3*. Port relief valves prevent the pressure from rising too high in different cylinders. If the load on the cylinder exceeds the pressure setting, the oil will flow from the cylinder via the relief valve until the permitted pressure is reached.*



4*. The check valves with adjustable restriction are located in the lift and outer boom cylinders. The adjustable restriction serves the purpose of setting the maximum lowering speed of the boom low enough to prevent cavitation of oil and burning of seals.*

5*. The stabiliser legs are fitted with pilot pressure operated check valves preventing the stabiliser leg from collapsing in situations of possible overload or hose burst.*



6*. The lift and outer boom cylinder as well as the boom extension cylinder can be equipped with a hose burst valve which locks the oil in the cylinder, if the flow speed in the cylinder rises to high e.g. when a hose comes loose. The hose burst valve will open, when oil is directed through it in the opposite direction.*

7. *Emergency stop button is in front of the top seat and it can be connected to stop the oil flow to the loader (for example with a solenoid valve). As an alternative it can be connected to*

stop the engine that is running the pump.

OPERATION

LOADER OPERATION

It is forbidden to use the loader, if the operator has not read and understood the manual and the safety instructions!

GENERAL

Good knowledge of the equipment's as well as sound practical experience are the conditions for the safe and effective loader use. Every loader model is different in working geometry and speed as well as response to the controls, and therefore even a very experienced operator should thoroughly examine the characteristics of a new loader.

TRAINING

An experienced operator drives many loader movements simultaneously adjusting different speed of movements to his liking. Naturally, the speed of the loader movements will decrease when the same oil flow is directed to many cylinders. An experienced operator manages the control levers calmly and softly and avoids jerks and sudden stops to make the work safe and effective and on a long term to eliminate unnecessary repairs. It is beneficial for an inexperienced operator to adjust the pump flow down, thus making it easier to avoid sudden movements. Get familiar with the loader by lifting smaller loads at the beginning.

COMMISSIONING OF THE LOADER

** Refer to Safety instructions atcommissioning.*

** Never connect the hoses to the loader, before the hydraulic system of the vehicle has been cleaned.*
** The hydraulic system of the loader is cleaned and tested by the manufacturer.*
** Test loading according to SFS 4261 has been carried out by the manufacturer.*
** Check that the hydraulic oil tank is full, any possible closing valve in the suction hose of the pump is open and that the pressure and return filters are in place.*
** Always start with cleaning the quick couplings. Connect the return hose before the pressure hoses. Assure yourself of proper connection of quick couplings. Should the return hose by mistake not have been connected, the control valve may be damaged.*

** When starting the engine, the hydraulic pressure must not be connected to the loader.*
** Check that the control levers of the loader are in middle position and that they return there when released.*

** Refer to Daily overhaul prior to operation.*

LOADER OPERATION

* Connect the pump and adjust the flow to about 60...80 l/min (1 circuit)).

* If you are working in freezing conditions, let the oil circulate for a while through the valves with small flow. Then carry out all the working motions slowly back and forth, so that the seal will limber up, before they are set under full pressure. The lowest recommended working temperature for the loader is - 25°C. The loader can be used even at a temperature of -35°C, if the truck's hydraulic system tolerates that.

* Notice that the hydraulic seals wear sooner, hoses are more likely to be damaged and the steel constructions are more exposed to brittle fracture in extremely low temperatures. In working temperatures below -25 °C it is more favourable to lift smaller loads than normally to avoid unnecessary damage.

* Equally, in very warm conditions, make sure that the hydraulic oil does not overheat (< 70 °C). Excessive oil temperature can damage the seals and furthermore shorten the operating life of the oil.

* Use the stabiliser legs to get the pillar of the loader in as upright position as possible.

* Observe the positions where the grapple or the boom can hit the cab or other vehicle constructions.

* Stop working immediately if there is any risk of danger.

* Make sure that there is sufficient working light.

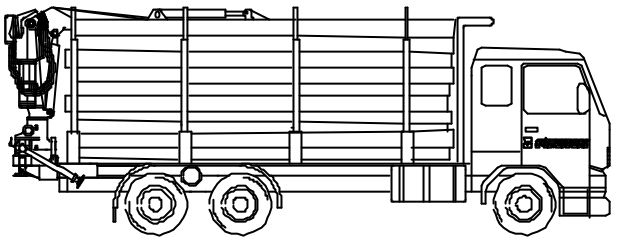
TRAFFIC ON PUBLIC ROADS

** Comply with all the statues and decrees of the Road Traffic Law when driving on public roads.*

** If the load area is empty, lower the end of the lift boom and the closed grapple on a bolster.*

** When the load space is full, leave enough space in the centre for the boom so that no part of the loader will rise above the permitted transport height.*

** Retract the stabiliser legs and the outrigger beams into transport position and secure them with lock pins.*
** Disconnect the hydraulic pump during transport drive.*
** Secure the load carefully with load straps.*
** Lock the detachable rear installation console mechanically to the vehicle chassis.*



** Do not exceed the permissible axle and total loads or transport dimensions.*

** Check the lights, reflectors, tyre pressure, trailer connection etc. before driving off.*

** Adjust the travelling speed to the situation. Make sure of full control of the vehicle at all times.*

** Observe the height of the vehicle when driving under electric lines, telephone lines and bridges.*

SERVICE

SAFETY INSTRUCTIONS WHILE SERVICING

** Start by becoming familiar with the service instructions, because faulty or inadequate service might damage the loader.*

** During service, maintenance or cleaning, support the booms against a rest! Never leave the booms supported only by the hydraulics!*

** Disconnect the pump and motor, if the loader is not to be used during service.*

** It is forbidden to open, tighten etc. a pressurised hydraulic system.*

** Entry of air in to the opened hydraulic system can cause sudden, unanticipated movements when retaking the loader into use.*

** When handling the loader or its components, use an overhead crane and proper lifting accessories with sufficient lifting power. Never stand under the load when working or lifting.*

** Avoid skin contact with oil or grease during work and service. They contain solvents and additives that can be harmful by repeated skin contact (dry and chapped skin). Old and dirty oils and greases are more harmful than new ones. Follow the instructions of the manufacturers and authorities when handling these substances.*

** If oil or grease have caused rash or inflammation, or they have got into the eyes, immediately contact a physician.*

** Always wear proper gloves, protective skin cream, eye protectors and proper protective clothing when handling oils and greases.*

** Never wear oily or greasy clothes and never keep oily tools or other oily objects in your pockets.*

** Never clean your hands with oils or greases.*

** Waste oil from service and repairs shall be sent to a waste treatment plant.*

SERVICE

HYDRAULIC OILS

Choose an oil suited for the hydraulic system of the loader and handle it correctly.

1. HYDRAULIC SYSTEM

** To function the loader needs a hydraulic system, consisting of a power unit, pump, oil tank, filter and other hydraulic equipment needed.*

** The oil in the hydraulic system works both as a transmission and a lubricant.*

** A high-class oil is the first condition for the undisturbed function of the loader.*

** Connect the loader only to a thoroughly cleaned hydraulic system equipped with a pressure filter and a return filter.*

** The system must also have a breather filter which prevents the entry of larger contaminant particles into the hydraulic oil. Despite the breather filter contaminant particles enter the oil tank with the air sucked into it.*

** Foreign particles are a risk factor, as the pump and valves work with very small plays.*

** Due to temperature changes water condenses in the hydraulic system. Especially in winter time the water may cause malfunction. Therefore change the oil often enough, according to service recommendations at least twice a year; in the spring and in the fall.*

** Replace filters often enough, according to service recommendations and always when changing oil.*

** The oil tank can be washed with paraffin or white spirit (never with diesel oil).*

2. THE CONDITIONS FOR A GOOD HYDRAULIC OIL

** Solidification temperature below -50°C.*

** The viscosity may not drop below 1.5 E°, +50°C in piston pumps and 2.5 E°, +50°C in gear pumps.*

SERVICE

HYDRAULIC OILS

** The hydraulic oil must contain required additives in regard to the lubrication ability, anticorrosion and foam prevention.*

** The oil shall be suited for the seal materials of the loader. (Never use motor oil in the hydraulics!)*

** Even a new hydraulic oil contains contaminant particles which, due to their size, can cause disturbances.*

3. CONTAMINANTS IN OIL

** Storing and transport tanks accumulate dirt.*

** An operating loader creates, due to component wear, metal and other particles, which enter the hydraulic system.*

** During loader maintenance contaminants enter the system.*

** With component damage greater quantities of contaminant can get into the circulation at one time.*

** Contaminants in oil can lead to a faster than normal component **wear**, temporary **malfunctions**, e.g. clogging up oil channels or jamming valve spindles, and worst of all, **component damage**.*

4. AVOID ENTRY OF CONTAMINANTS INTO THE OIL

** Do not store the oil vessels outdoors - risk of water condensing in the oil.*

** Store the oil in closed original vessels. If possible, pour the oil directly from the vessel into the tank.*

** Use clean vessels when handling the oil. Make sure that the plugs, funnels, sieves and the filling pipes are clean.*

HYDRAULIC OILS

** Clean the surroundings and the place to be repaired prior to work. Make sure that no grinding or welding work is done nearby, when the hydraulic system is opened. Keep the working place, hands and tools clean and use correct tools.*

** Avoid repairing the hydraulic system outdoors or in dusty conditions.*

** Try to locate the fault as well as possible to avoid having to open the system too much.*

** Make sure that the dismantled parts and the place of repair are well covered.*

** Do not unpack the spare parts before the moment of installation.*

** Clean filters and replace filter cartridges according to service instructions.*

** Blow the hydraulic hoses and pipes and wash them, when necessary, prior to installation. Wash the parts with paraffin or white spirit before installing.*

** Always use high-class oils with correct viscosity.*

BY FOLLOWING THE SERVICE INSTRUCTIONS AND REMEMBERING ABSOLUTE CLEANNESS DURING HYDRAULIC INSTALLATION THE LOADER WILL FUNCTION RELIABLY AND UNNECESSARY MALFUNCTIONS CAN BE AVOIDED.

5. BIODEGRADEABLE HYDRAULIC OILS

** Instead of normal hydraulic oils, oils that quicker dissolve in the environment have been developed to minimise the damage in case of oil leak. Many forest management companies request the use of biodegradeable oils in machines that work in forests managed by them.*

** Normal oils cannot directly be replaced with any biodegradeable oil without altering the hydraulic equipment (e.g. pump seals, hoses).*

** Biodegradeable oils are divided into three main classes:*

1. Hydraulic oils based on vegetable oils (HETG) e.g. turnip rape oils
2. Synthetic hydraulic oils based on polyglycols (HEPG)
3. Synthetic hydraulic oils based on esters (HEE)

ALERT ! *Before starting to use biodegradeable oil, consult your dealer when choosing a suitable oil type and clarify its suitability for the pump seals and other hydraulic components.*

HYDRAULIC SCHEMES PATU 2006

1 Control valve
2 -
3 Stabilizer leg control valve
4 -
5 Rotator (check the pressure settings from the manufacturer)
6 Outer boom cylinder
7 Extension cylinder
8 Lift cylinder
9 Grapple cylinder (check the pressure settings from the manufacturer)
10 Slewing cylinders
11 Stabilizer leg cylinder
12 Outrigger beam cylinder (optional accessory)
13 Check valve with adjustable restriction (anti-cavitation valve)
14 -
15 Pilot pressure operated check valve
16 Restrictor nipple
17 Pressure gauge connector
18 Pressure filter
19 Return filter
20 Hydraulic pump
21 Oil tank
22 Swivel
23 Swivel
24 Quick connector
25 Quick connector
26 -
27 -
28 Relief valve 250 bar, hydraulic system of vehicle

FITTING AND COMMISSIONING

SAFETY INSTRUCTIONS AT COMMISSIONING

** The Foresteri loader is designed for timber loading and shall be operated only by a person familiar with its use.*

** Get familiar with the loader design, functions, controls and user manual before taking the loader in use.*

** Do not operate the loader without having read and understood the manual and safety instructions.*

** Follow all instructions and warnings on the loader to avoid unnecessary damage.*

** Ensure the stability of the vehicle in all circumstances (see Instructions for determination of stability by calculation - loader cranes).*

** Make sure that the loader is fitted properly (see later in this chapter).*

** Do not start the vehicle unless the hydraulic pressure to the loader is disconnected.*

** Use extreme caution while engaging or disengaging the loader from the back of the truck, if a detachable mounting console is used.*
- the ground must be firm and level.
- use a locking pin to prevent the stabilizer legs from folding (danger of tipping over)!
- remember the safety chain.

** Always connect the return hose before pressure hoses. Make sure that the hose is properly connected, or the control valve may be damaged.*

** When connected to the hydraulic system for the first time there might be air in the hydraulic lines which can cause sudden and uncontrolled movements. Vent the system carefully by driving all the cylinders to their limits 4...5 times.*

** Before connecting the pressure to the loader check that all the control levers of the loader are in middle position and also return to middle position when released.*

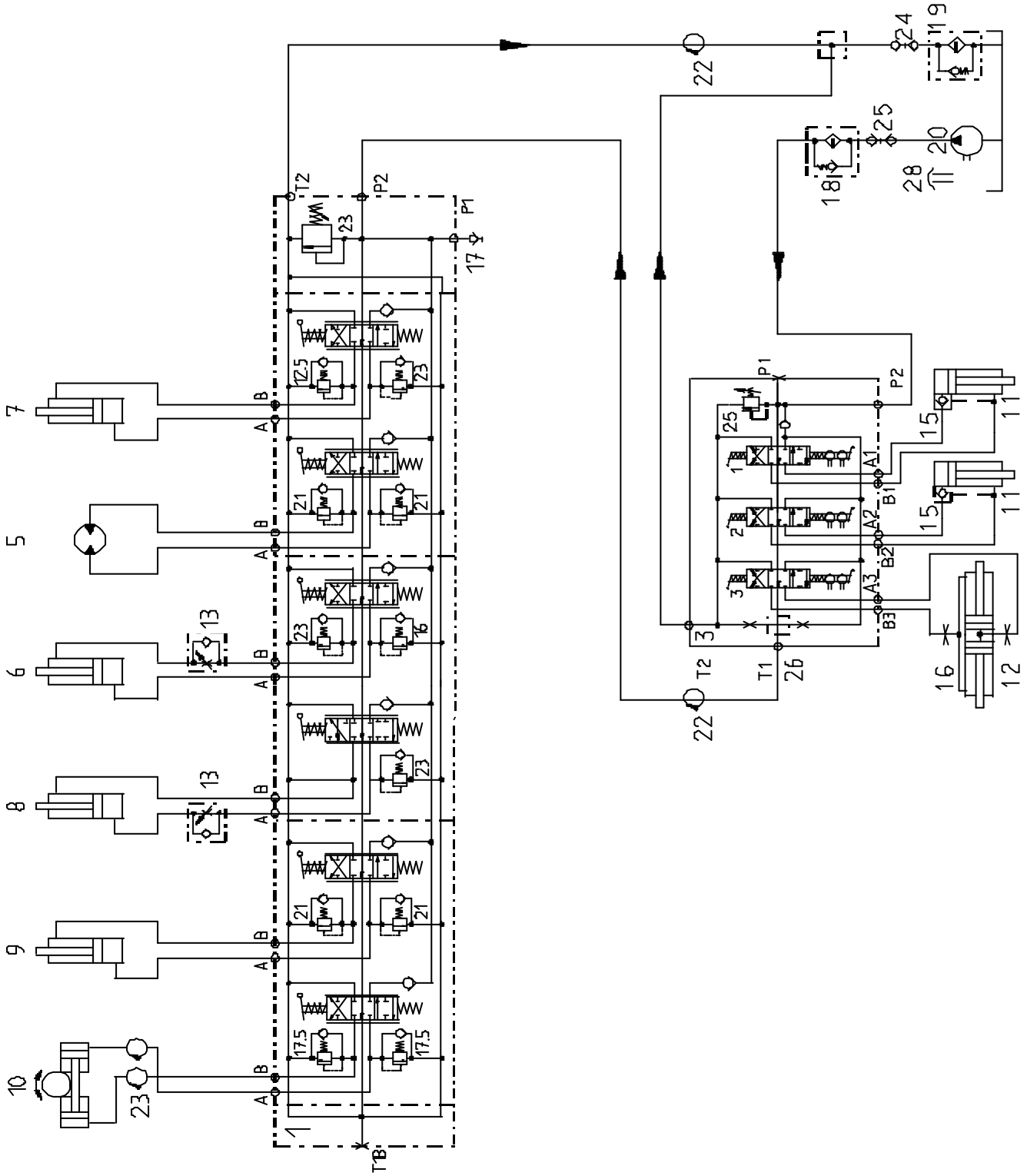
** Note the location of EMERGENCY STOP button before operating the loader.*

TECHNICAL SPECIFICATIONS

KESLA OYJ

HYDRAULIC SCHEME P2006 (4 LEVER, 1 CIRCUIT)

Pressures: MPa.

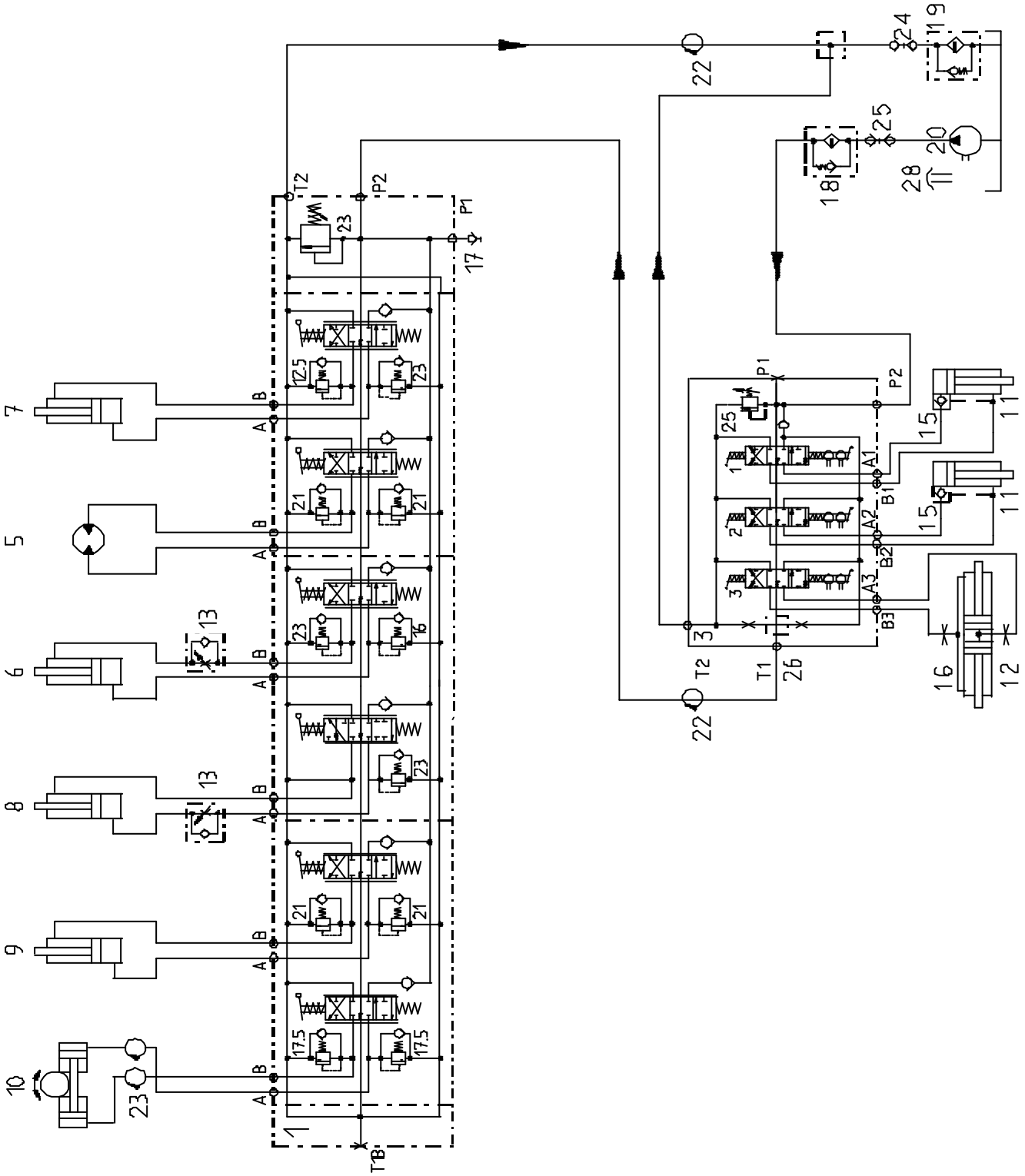


KESLA OYJ

TECHNICAL SPECIFICATIONS

HYDRAULIC SCHEME P2006 (2 LEVER, 1 CIRCUIT)

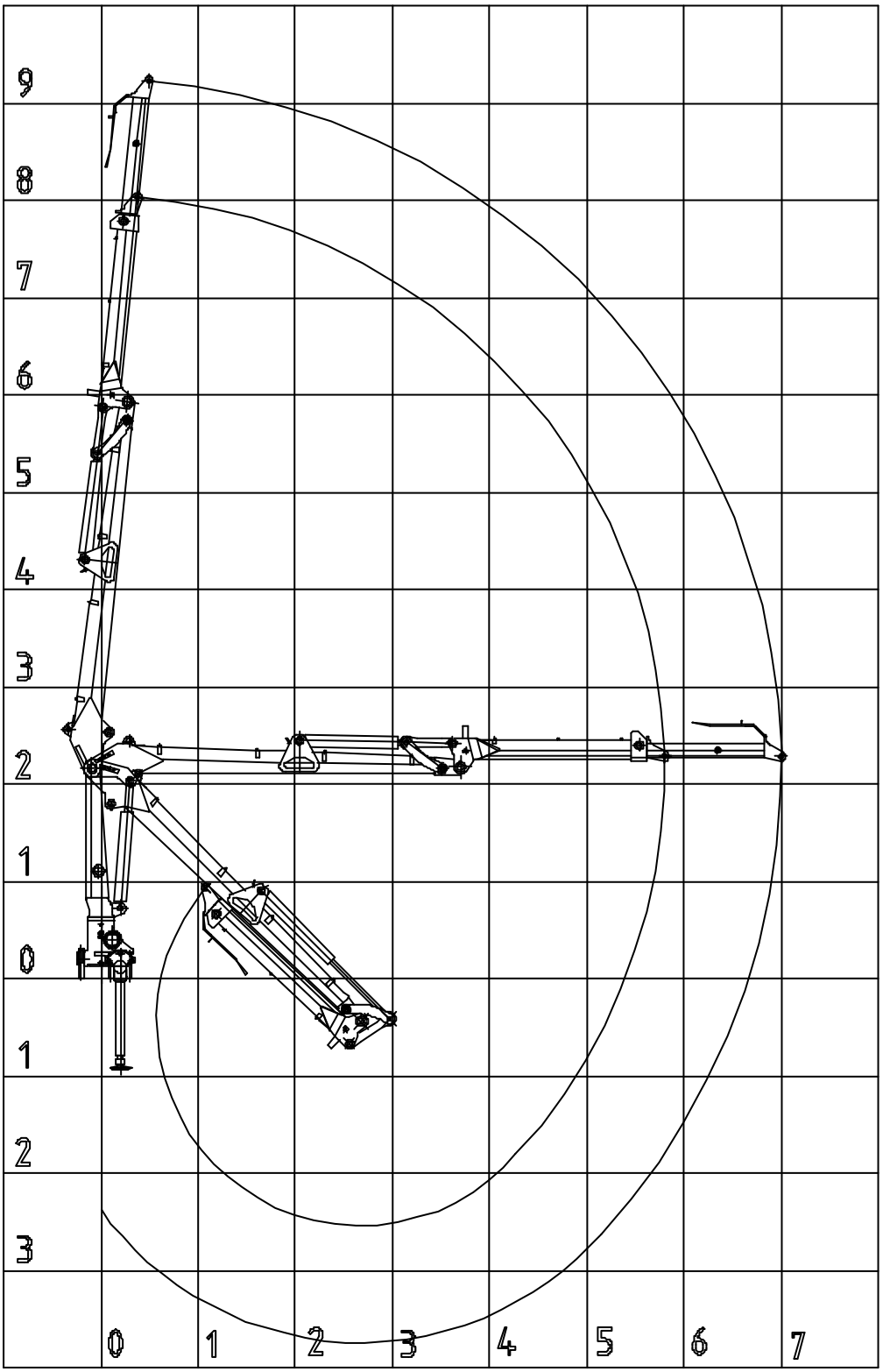
Pressures: MPa.



TECHNICAL SPECIFICATIONS

KESLA OYJ

REACH DIAGRAM P2006



The technical specification gives the main functional measures as well as the lifting power and pressure settings.

TECHNICAL SPECIFICATION		P2006
Lifting capacity, gross net	kNm kNm	85 65
Reach	mm	7000
Stroke of boom extension	mm	1200
Slewing torque, gross	kNm	14.6
Slewing angle	°	415
Weight less oil, grapple and rotator	kg	1550
Pump recommendation - working pressure - flow - power input	 MPa (bar) 1- pump l/min 1- pump kW	 23 (230) 60-80 23-31
Pulling force of extension	kN (kp)	20.6 (2060)
Height: fastening level - upper link of pillar	mm	2160
Transport width	mm	2200

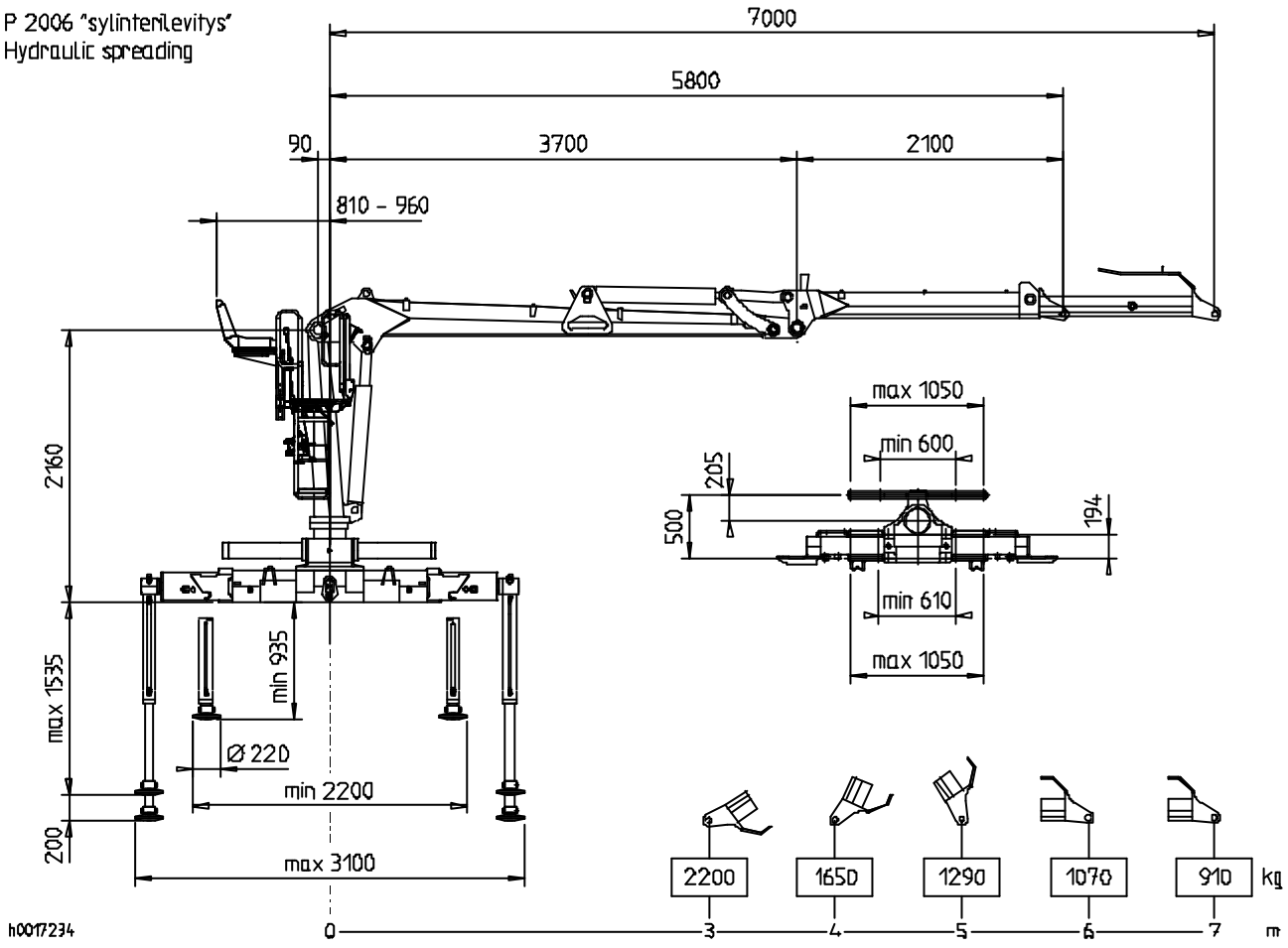
ACCESSORIES

ROTATORS		MR8AF	GV11-2
Slewing angle		¥	¥
Slewing torque (20 MPa)	kNm	1.4	2.2
Weight	kg	56	58

TIMBER GRAPPLES		F28	F36	Hultdins SG 260
Jaw pressure at the tips	kN	12,5	18.0	12,1
Area	m^2	0.28	0.36	0.26
Weight	kg	163	220	154

DIMENSIONAL DRAWING (hydraulic spreading)

ALLOWED LOADS (hydraulic spreading)

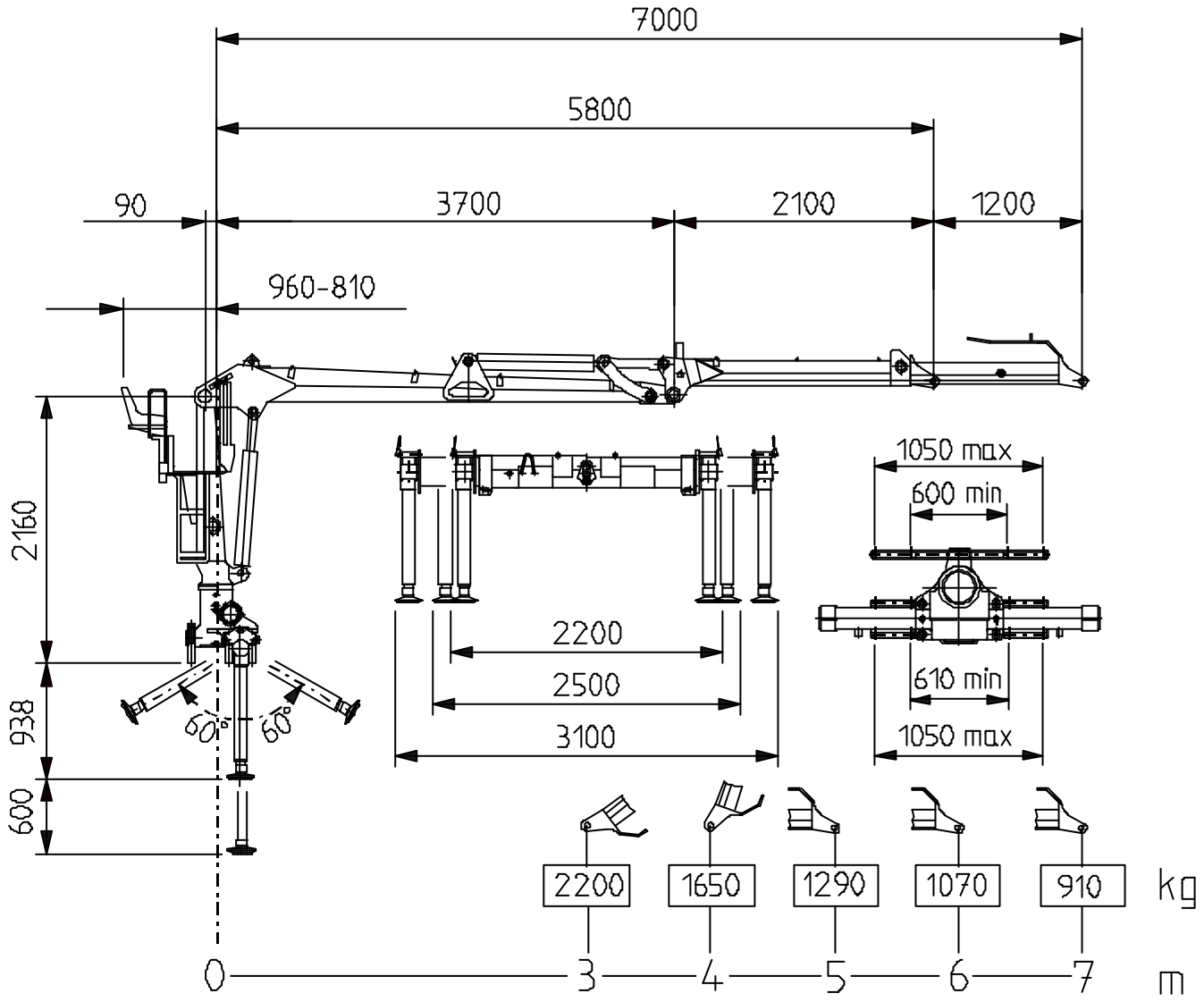


TECHNICAL SPECIFICATIONS

KESLA OYJ

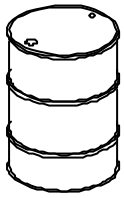
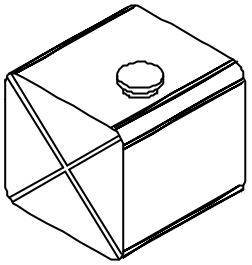
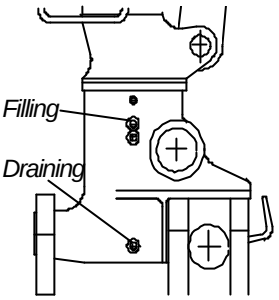
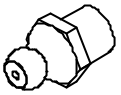
DIMENSIONAL DRAWING (mechanical spreading)

ALLOWED LOADS (mechanical spreading)



OILS AND LUBRICANTS

The table below shows some hydraulic oils, lubricating oils and greases suited for loader use.

Oil brand	Hydraulic system		Slew mechanism	Grease nipples
	 Summer Winter		 Filling Draining	 Sliding surfaces Chain
BP	ENERGOL SHF 46	ENERGOL SHF 32, 22	HYPO GEAR 80W / 90 EP	ENERGREASE LS-EP2, L21M
EXXON	UNIVIS N 46	UNIVIS N 32,22	GEAR OIL GX 80W/90	BEACON EP 2, MULTIPURPOSE GR MOLY
MOBIL	DTE 16	DTE 15,13	MOBILUDE HD 80W-90	MOBILUX EP 2, MOBIL GREASE MP, SPECIAL
SHELL	TELLUS OIL T/TX 46	TELLUS OIL T/TX 32,22	SPIRAX HD 80W/90	ALVANIA EP GREASE 2
TEXACO	RANDO OIL HDZ 46	RANDO OIL HDZ 32, HYDRAULIC OIL HD 5W	MULTIGEAR LUBRICIANT EP 80W/90	MARFAK MULTIPURPOSE 2, MOLYTEX GREASE 2

** Follow the pump manufacturer's cold start instructions when starting the machine.*

** If the oil temperature does not rise above 70° C in the summertime, winter oil can be used all year around.*

** First filling oil ESSO UNIVIS N 32.*

** Foremost follow the recommendations of the vehicle manufacturer or the supplier of the hydraulic system, when choosing hydraulic oil.*

** Because the oil volume, depending on loader size, is about 50 l, a lot of oil will remain when changing the oil. Therefore, pay special attention to the compatibility of the refilling oil and the first filling oil.*

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SERVICE

TENSIONING TORQUES

Description	Part number	Screw/Thread	Nm (kpm)
Loader mounting Slew mechanism mounting	9001 3950 9001 3836	M 30 M 30	1200 (122)
Slewing cylinder Piston	301 0601 302 0026	M14x60, 12.9 M24, nyloc*	200 (20) 700 (71)
Lift cylinder bush Piston	2850 2202 302 0049	M114.5x2 M39x3, nyloc	** (900) (92)
Outer cylinder bush Piston	2832 1202 302 0049	M114.5x2 M39x3, nyloc	** (900) (92)
Boom extension cyl., single extension bush Piston	2824 6202 302 0009	M64x2 M20 nyloc*	** 400 (41)
Stabilizer leg cylinder bush Piston	2838 2202 302 0119	M104x2 M55x2, KM11	** 200 (20)
Outrigger cylinder bush Piston	2833 7202 302 0026	M55x2 M24, nyloc*	700 (71) 700 (71)
Mounting of controls Control valve segments	F-130 CF	M12	60 (6)
Mounting of hydraulic pipes		M10***	40 (4)

* When opened, remove and replace with a new nyloc-nut.

** Screw down and secure with locking screw.

*** Secure with bonding fluid e.g. LOCTITE 242 or corresponding.

SERVICE

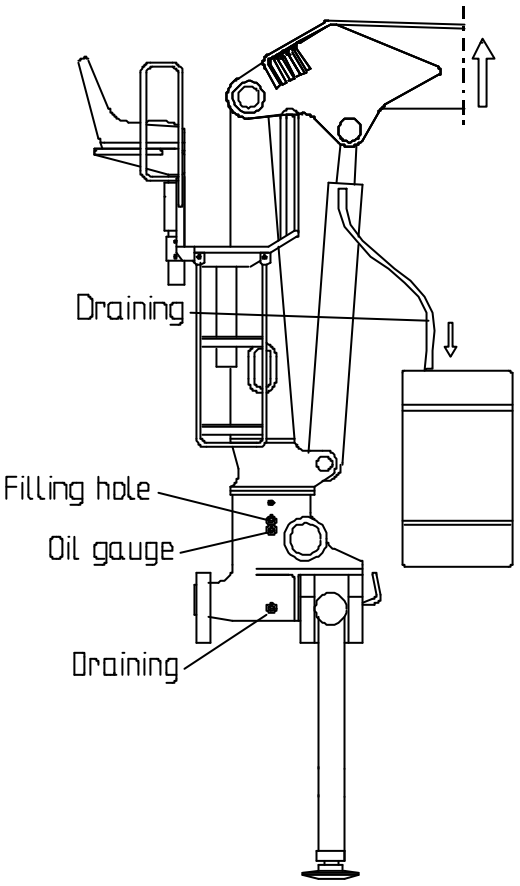
MAINTENANCE PROCEDURES

1. GENERAL

** Service the loader regularly to ensure its safe and troublefree function.*
** All the tools needed for maintenance of a Foresteri-loader are included in the delivery. Thus the operator can carry out almost all the maintenance by himself.*
** Do not ever alter the relief valve pressure settings so that they differ from the values in the hydraulic scheme without the manufacturers permission. Have an authorized service shop to do the adjustments and repairs of the valves.*
** The loader is thoroughly factory tested and adjusted before delivery.*
** Never use a loader, which is out of order, but repair even minor faults and defects before they cause damage* ***(refer to Daily overhaul prior to operation).***
** We have prepared the tables with* ***Periodical checks and service procedures*** *and* ***Trouble shooting*** *to make the maintenance and locating the faults easier for you.*

2. OIL CHANGE

** Change the oil of the hydraulic system in the spring and in the fall or every 1000 operating hours. The oil volume of the loader is at its smallest, when all the hydraulic cylinders are pushed in. Empty the oil tank and clean it, if needed, and replace filter cartridges. Fill oil tank with hydraulic oil to the upper mark, (refer to Oils and lubricants). If the old oil is very dirty, drain the cylinders separately: Remove the hose on the rod side and put it in a waste oil vessel. Drive the piston rod out and connect the hose.*



Change the oil of the slew mechanism once a year and drain the water 2 times/year. Check the oil quantity from the oil gauge and change the oil by opening the draining and filling plugs. Incline the loader in the direction of the draining plug. When the tank is empty, screw the draining plug back and fill hypoid oil into the slew mechanism to the upper edge of the oil gauge (refer to Oils and lubricants) ***ALWAYS DRAIN THE WASTE OIL INTO A VESSEL AND SEND IT TO A WASTE TREATMENT PLANT.***

SERVICE PROCEDURES

Maintenance point		Procedure	Maintenance interval/h	Note!
General	1	Check cylinders and hoses for leakage	10	Daily
	2	Check pin lockings and fitting bolts of loader	10	Daily
	3	Check condition of hoses and hose couplings	50	
	4	Clean load-bearing structures and check their condition	250	
Slew mechanism	5	Lubricate bearings with a grease gun	10	
	6	Tighten fitting bolts	250	1200 Nm Initially after 50h
	7	Check oil quantity	10	
	8	Change oil	1000	Initially after.50h
Booms	9	Lubricate bearings with a grease gun	10	
	10	Check bearings	250	
	11	Check the mounting of cylinder bushes and pins	250	Tighten if need
Extensions	12	Lubricate bearings with a grease gun	10	
	13	Brush grease on extensions	50	
	14	Check horizontal clearance of glide pads	50	Adjust if need
	15	Check vertical clearance of glide pads	250	Adjust if need with shims
	16	Tighten the rotator pin	250	Initially after 50h
Chains	17	Lubricate chains	50	
	18	Check chain tension and adjust, if needed	50	
	19	Clean chains	1000	Change if need.
Controls	20	Lubricate links	50	
	21	Check fitting screws	250	Tighten if need
Hydraulic system	22	Change pressure filter	500	Initially after 50h
	23	Change return filter	1000	Initially after 50h
	24	Change oil	1000	At least 2 x / year
Control cables	25	Lubricate cables - Mixture of antifreeze and water, 50% / 50% - Oil-spray with teflon	When freezing problems	At least 1 x / month

SERVICE

KESLA OYJ

FAULT FINDING CHART

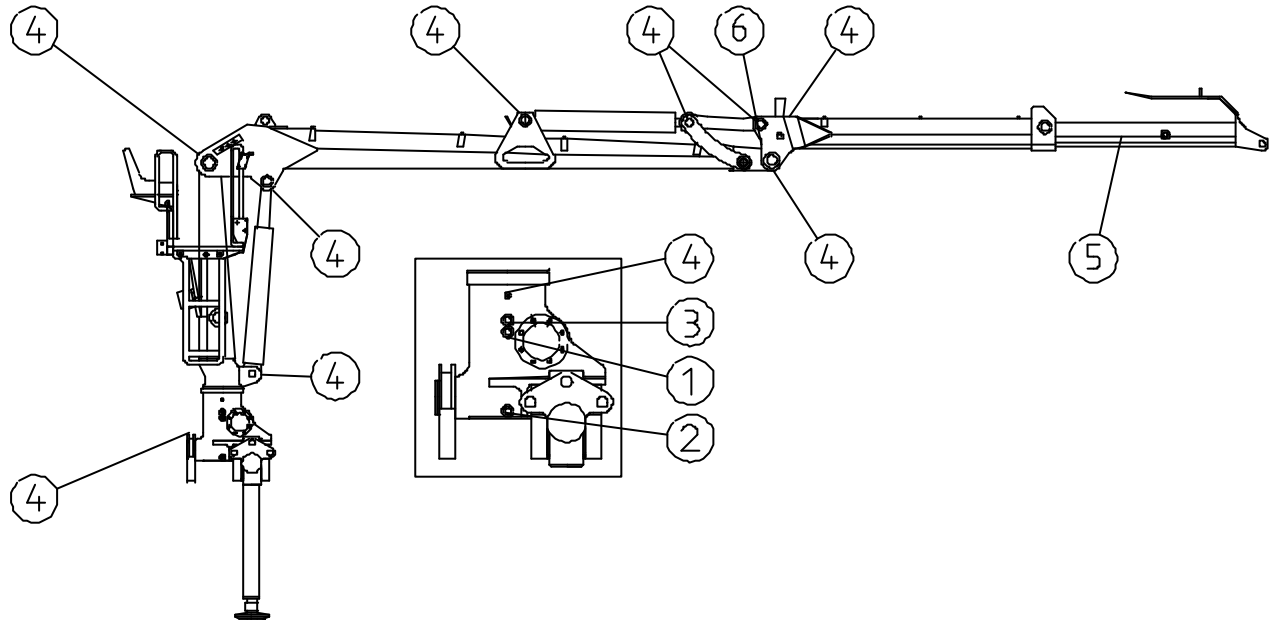
The chart shows the most common problems and their reasons as well as the procedures to eliminate them. Contact the service department for more information. Always follow the safety instructions during repairs!

MALFUNCTION	POSSIBLE REASON	ACTION
The loader is not moving	- Empty oil tank - Pressure hose connector not connected or faulty - Pump does not generate pressure	- Add oil - Check the connection and replace with new quick coupling - Check pressure at the inlet section of control valve , check the relief valve of pump
The loader moves some or is powerless	- Return hose connector not connected or faulty - Defective or dirty main relief valve or dirty or faulty pump relief valve (if fitted)	- Check connection, measure back pressure of return line - Check pressure at the inlet section, replace relief valve if needed
One function powerless	- Relief valve at the particular spool faulty or dirty	- Check pressure of this function, replace with new relief valve if needed
Boom goes slowly down with normal load	- Relief valve of this particular function leaks - Cylinder seal leaks This particular function goes down under load and cylinder is overheating when loading - Valve spool leaks Spool of particular function does not hold, and the valve slice overheats when loading.	- Replace relief valve -. Change seals. - Change the spindle or whole segment
Hydraulic system overheated	- Worn pump, internal leakage - Too high back pressure - Pump flow exceeds the max. flow of the control valve - Not enough oil in hydr.system	- Check flow at high pressure while the oil is hot. Replace the pump if needed - Check back pressure in return line, work with smaller flow - Add oil
Valve spindles get stuck	- Overheated hydraulic oil - Dirt in valve - Studs connecting the slices too tight or too loose	- Refer to above - Check if oils and filters have been changed acc. to instr. - Check tightening torques
Oil leaking from the slew housing	- Slew cylinder seals leak - Radial seal leaking	- Change seals, if needed (the seals might let some oil by, especially if oil is very cold) - Tighten by turning axle seal spring, replace axle seal if needed

SERVICE PROCEDURES/LUBRICATING POINTS

NOTE! *LUBRICATE THE SPHERICAL BEARINGS AND BUSHINGS AT BOOMS WITH (BLACK) GREASE, MOLYBDENUM SULFIDE CONTENT (2 %).*

USE UNIVERSAL (YELLOW) GREASE FOR OTHER POINTS.



NOTE! SHORTEN THE LUBRICATION INTERVALS, IF WORKING CONDITIONS ARE UNFAVOURABLE E.G. DUSTY

Ref.	***Lubricating point***	***Pcs***	***Procedure***	***Lubrication interval***
1	*Slew mechanism, oil gauge*	*1*	*Check*	*10*
2	*Slew mechanism, lower plug*	*1*	*Drain, water draining 2 times/year*	*1000*
3	*Slew mechanism, upper plug*	*1*	*Oil change/add if needed*	*1000*
4	*Spherical bearings and bushings*	*20*	*Grease with grease gun*	*10*
5	*Outer surfaces of extensions*	*1*	*Greasing/ oil*	*50, (SAE 10W50)*
6	*Inner surfaces of extensions*	*1*	*Greasing/ oil*	*50, (SAE 10W50)*

LUBRICATION POINTS

1. SLEW MECHANISM

- A couple of presses with the grease gun will do.

* Lubricate the upper bearing of the slew mechanism (2 grease nipples) regularly.

* The other parts of the slew mechanism are oil immersed. Check oil quantity through the oil gauge with the machine standing on even ground. Add if needed (hypoid oil SAE 80W/90).

* The bushings at the top end of the stabilizer leg have 2 grease nipples and the pendulum beam has one.

2 LIFT BOOM

- Lubricate the bushing by squeezing in so much grease, that some oozes out.

* The bushing at the upper end of the pillar has one grease nipple.

* The bushing in the link between the lift and outer boom has 2 grease nipples.

* Lubricate the bushing in the lift boom links from the grease nipple located at the lower side of the boom.

* The linkage bar has 3 grease nipples.

* Lubricate the spherical bearings (4 pcs) of the lift and outer cylinder regularly.

3. OUTER BOOMS

* Lubricate the rear glide pads of the extension from the grease nipple on top of the outer boom. Keep the extensions retracted.

* All of the grease nipples of the loader can be lubricated at one time by folding the outer boom, with the extension retracted, under the lift boom in an angle. In this position the inner surfaces of the extensions and the inner chain are oiled through the back end of the outer boom.

* Finally extend the extensions fully and oil or brush grease on the top, bottom and sides.

DISMANTLING THE SLEW MECHANISM

Refer to Safety instructions while servicing.

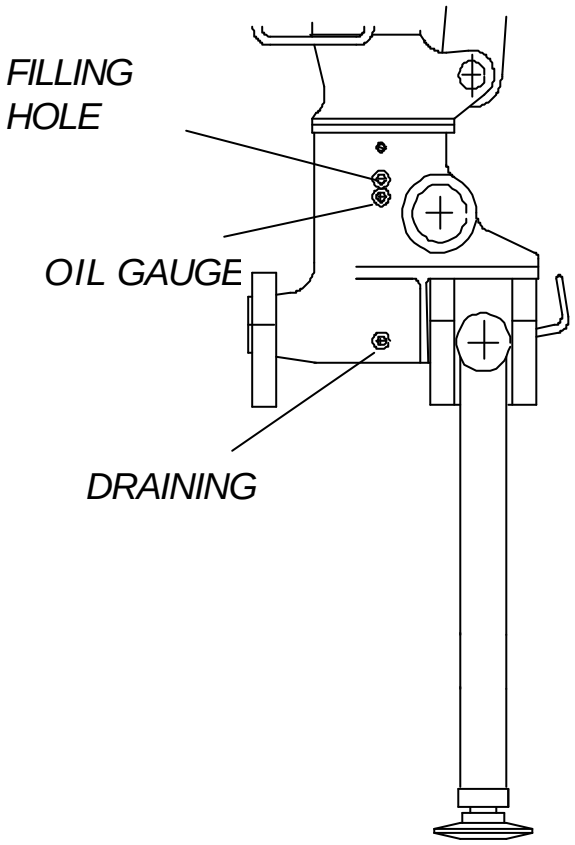
1. Slew the booms to their center position.

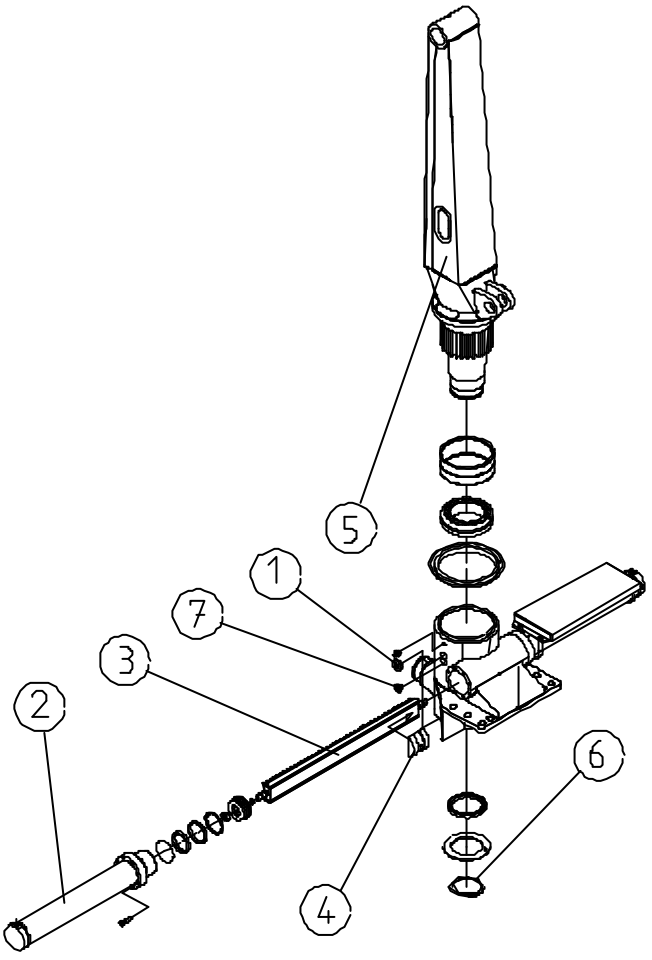
2. Drain the oil from the slew mechanism into a vessel by opening the draining and filling plugs (1).

3. Remove the cylinder barrels (2) and drain the oil into a vessel. The rack bar (3) and its thrust bearing (4) can be removed without removing the pillar.

4. The pillar (5) can be lifted away by removing the locking ring (6) from the lower end and the hoses going through the pillar. The pillar can be lifted away without removing the slewing cylinders and the rack bar.

5. Mount in the opposite order and finish by adding hypoid oil 80W90 into the slew mechanism to the oil gauge (7).



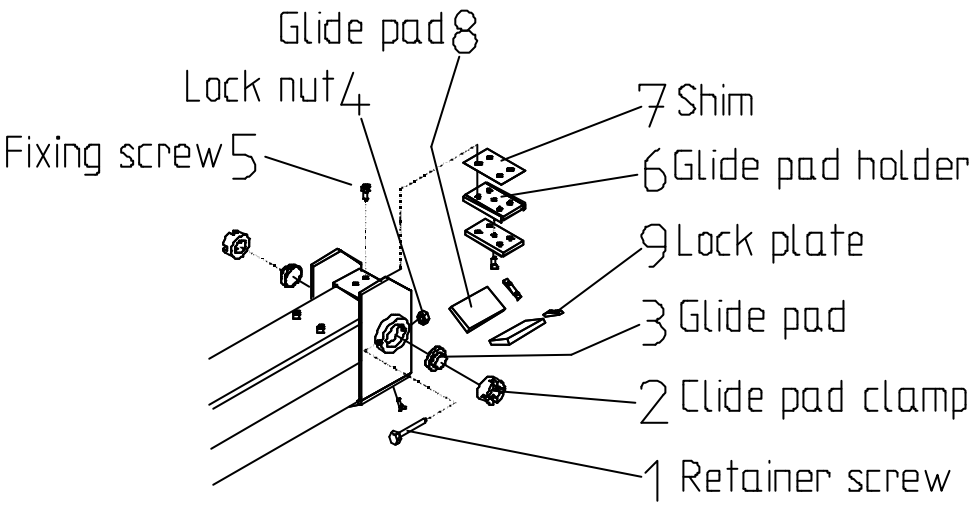


DISMANTLING THE OUTER BOOM

1. Drive out the extension about 30 cm.
2. Remove the extension cylinder from the outer boom as well as the hydraulic hoses.
3. Remove all glide pads from the mouth of the outer boom.
4. The whole extension package can be pulled out from the outer boom.

ADJUSTING THE HORIZONTAL CLEARANCE

* Remove the locking screw (1) of the side glide pad.
* Turn the glide pad clamp (2) clockwise equally much on each side of the boom, until there is no clearance. If this does not eliminate the clearance, the glide pad (3) is worn and must be replaced.
* Turn the glide pad clamp (2) back for the locking screw (1) to fit in. Secure with lock nut (4).



ADJUSTING THE VERTICAL CLEARANCE

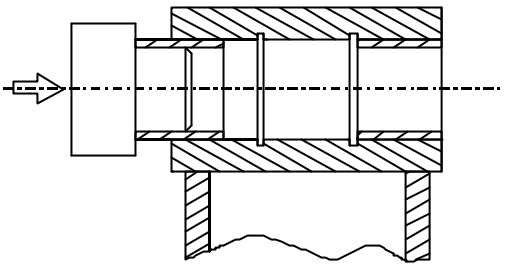
* Open the fixing screws (5).
* If needed, add shims (7) between the glide pad holder (6) and the top surface of the boom (shim thickness 1 or 2 mm).
* There is no adjustment left, when the glide pads (8) of the bottom side are worn to almost the same level as the lock plates (9). If so, change the glide pads (8).

NOTE! If the glide pads are adjusted too tight they will wear sooner or the extension may not move at all.

REPLACING THE BUSHINGS

Refer to Safety instructions while servicing.

** The booms are fitted with exchangeable thin shell bushings with grease pockets, which are long lasting when correctly lubricated.*
** When the bearing is so worn that there is a distinct clearance in the link, remove the pin and the old bushings by opening them at the seam with e.g. a wedge.*
** Use a matching assembly core when installing a new bushing to prevent damaging the end of the bushing.*
** Also check that possible greasing holes align.*
** Before fitting the pin, check its condition and lubricate the new bushings with grease.*



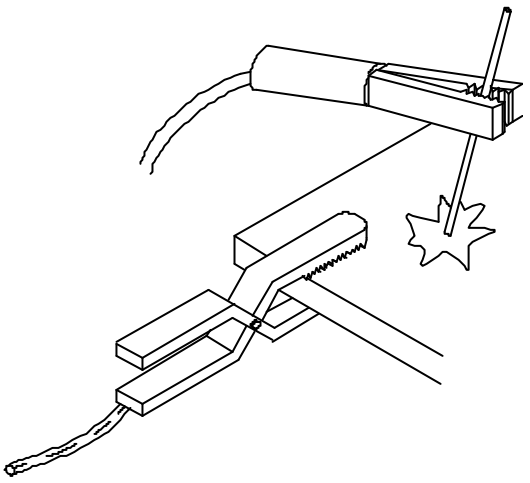
REPLACING HYDRAULIC COMPONENTS

** When replacing hydraulic components like hoses, pipes, seals etc., make sure that the new components are compatible with the original ones.*
** Original spare parts will ensure safe and undisturbed function.*
** Keep the hydraulic system of the loader in good condition and replace defective parts, e.g. hoses, pipes etc.*

REPAIR WELDING

Do not ever modify the structures of the loader or weld supplementary parts on it without permission from the manufacturer.

If modifications or repairs are done by welding, observe following:
** The welder must be fully qualified, quality class WC.*
** Remove paint and grease from the area to be welded.*
** Always connect the earth conductor to the part to be welded. No links in between!*
** The suitable electrode is OK 48.30 or corresponding. Use dry electrodes.*
** For MIG / MAG welding use OK Autorod 12.51 or corresponding.*



MEASURING THE HYDRAULIC PRESSURE

Refer to Safety instructions while servicing.

** Perform the pressure measuring with the hydraulic system in normal working temperature and with normal flow (about 60 l/min).*

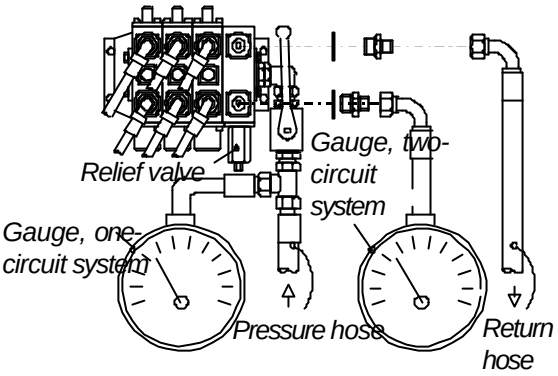
1. SYSTEM PRESSURE (P1)

** Connect the pressure gauge either to the gauge connector at the pump section of the control valve or with a connecting nipple to the pressure hose.*

** Start the pump and pull the extension fully in. Hold the control lever back.*

** Read the system pressure. (Compare with the main pressure in the hydraulic scheme).*

** Release the lever to their middle position and read the back pressure.*



2 CYLINDER PRESSURES (P 2)

** The pressure of each working movement (main lift, outer boom, slew, extension, grapple, rotator) is reached by driving each function toward its limit with the control lever.*

** If the pressure setting of the port relief valve is less than the main pressure, the valve should open. The opening pressure may exceed the hydraulic scheme setting with max. 5 %.*

** Functions having a higher pressure settings in their port relief valves than the main pressure can be measured by changing to a 250 bar main relief valve before measuring. Also the frame line relief valve in the truck (if fitted)must have a setting of 250 bar during measuring.*

** Perform the measuring and compare the result with the hydraulic scheme. Replace the relief valve, if needed.*

Never raise the pressure settings of the control valve. It can cause overload and break the loader.

STORING THE LOADER CRANE

If the loader is to be stored for a longer period, carry out following preparations:

** Clean the loader thoroughly with e.g. a jet sprayer.*

** Lubricate all lubrication points after washing to remove any possible water from the bearings and thus to prevent corrosion.*

** Oil the piston rods and the control levers with e.g. spray.*

** Check the oil quantity of the slew mechanism and add, if necessary. Drain some oil from the draining plug to let out any condensed water.*

** Brush paint on the points, where it is cracked or worn.*

** By repairing all faults and defects now, the loader will be ready for work when taken into use again.*

** Store the loader with the slew mechanism in upright position and support it properly to prevent it from tipping over.*

** Store the loader away from sunlight, preferably under roof.*

** **Reuse after storing**: Clean the piston rods, check the slew mechanism oil, the fixing screws of the loader and function of the safety equipment.*

DISCARDING THE LOADER

When the loader has come to the end of its service life and can no longer be repaired, it shall be discarded in a way, which will cause no needless harm to the environment.

1. Deliver the machine to a scrap metal treatment plant, where it will be unassembled according to regulations.

2. If unassembled by yourself:
- Drain all the oil from the hydraulic system and slew mechanism and send the oil to a waste oil treatment plant.
- Remove the hydraulic hoses and send them to a waste (recycling) rubber collecting place.
- Send the metal parts to a scrap metal dealer.

SERVICE

KESLA OYJ gives a manufacturer's warranty for Foresteri truck loaders as stated below:

* *Twelwe (12) months from the date of delivery to the end user. The warranty is valid for new products only for the above stated time while in the possession of the first owner.*

* *The warranty will cover any defects in the machine or its accessories due to structural failures, faulty raw materials or workmanship. The defective part in the machine or accessory is replaced free of charge with a new or reconditioned part by the guarantor.*

* *The warranty shall not apply to hydraulic hoses and their connectors or hydraulic oil seals. For purchased components Kesla Oyj will pass on a warranty that is equal to the warranty given by the subject component's manufacturer to Kesla Oyj.*

* *The warranty shall not apply to any faults or defects arising from normal wear, negligence or improper operation, faulty installation or incorrect or inadequate care and maintenance.*

* *Kesla Oyj will not assume any liability for any economical losses which the purchaser may incur through a failure of the product or for any consequential damage to persons or property resulting from a failure of the warranted product.*

* *Warranty shall be invalidated if any repairs to the warranted product have been made by others than the manufacturer or the manufacturer's sole representative. The warranty shall be invalidated also if the preset pressure settings have been altered.*

* *A written warranty claim for the defective part must be submitted to the guarantor within a period of thirty (30) days at the most from the date of reparation.*

  The warranty claim form must always be filled with the following information:

  - *make and model*
  - *machine number*
  - *date of delivery to the client*
  - *date of reparation*
  - *description of the defect*
  - *name, address and telephone number of the client*

- reference number of invoice or Bill of Material of the exhanged spare parts

KESLA OYJ

INSPECTION

CERTIFICATE OF FITTING

Customer	*Loader model*	*Serial number*	*Year*
Sold by	*Fitted by*		

Fitting Inspection must be carried out immediately after fitting, prior to taking the loader in use. This certificate must be filled at the assignment of the loader to the customer. The fitter that has the authorisation from the manufacturer confirms with the signing of this certificate that the loader has been inspected at the time of assignment and meets the Code of Practice for the Safe Application and Operation of Truck Loaders.

To be inspected before testing the loader		*Accepted*	*To be fixed*	*Fixing accepted*
1	*Correct User's and Service Manual supplied with the loader*			
2	*Stability has been verified through calculation or testing*			
3	*Safe working load table, Safety decals*			
4	*Fixing of the loader to the vehicle*			
5	*Movement of control valve spools, return to neutral position*			
6	*The fitting of the hydraulic pump, PTO-shaft*			
7	*Hydraulic system fitted to the truck fit for the loader*			
8	*Pressure and return filters fitted*			
9	*Quick connectors are good and properly connected*			
10	*Amount and quality of hydraulic oil; slewing gear oil*			

The work procedure and testing				
1	*Lubricating the joints (bearings and bushings) and cables*			
2	*Air removal by driving all movements to their limits 4 to 5 times without load*			
3	*Test (according to SFS 4261)*			
4	*Control lever movements and loader movements correct*			
5	*All of loader movements reach their limits*			
6	*Pressure relief valves operate correctly*			
7	*The booms stay up; no internal leakage*			
8				

Inspections after testing				
1	*No leakage*			
2	*Temperature of hydraulic oil stays normal*			
3	*Installation has been done according to CE-directives and standards and the installer's CE-plate has been affixed to the vehicle*			
4	*The operator is instructed to safe operation of the loader and he has familiarised himself in the User's Manual*			

NOTES

Place	*Fitted by/Signature of the Fitter*
Date	*Accepted by/Signature of the Customer*

KESLA OYJ

CERTIFICATE OF ANNUAL SERVICE AND INSPECTION OF TRUCK LOADER

Customer name	*Loader model*	*Serial number*	*Year*
Customer address and telephone		*Inspected by*	

Fitting method

mounted *oTractor* *oRoof* *oBack of truck, fixed*

cab *oTruck* *oBehind the* *oBack of truck, detachable*

oTrailer *oFront* *oCentre*

To be inspected before testing the loader		*Accepted*	*To be fixed*	*Fixing accepted*
1	*No structural changes made*			
2	*Serial number tag; Safe working load plate; Safety decals*			
3	*User's manual; Service manual*			
4	*Hydraulic oil tank; return filter*			
5	*Pressure filter(s)*			
6	*Quick connectors on pressure and return hoses*			
7	*Control lever frames*			
8	*Function of control levers; Returning to neutral position*			
9	*Control valves*			
10	*Safety valve for stabiliser control*			
12	*Condition of hydraulic hoses*			
13	*Condition of hydraulic tubes*			
14	*Fitting of loader; fitting bolts*			
15	*Condition of the slewing device*			
16	*Condition of the boom assembly*			
17	*Condition of the stabiliser legs*			
18	*Pins and their locking*			
19	*Grapple, rotator and link*			
20	*Work lights*			
21	*Crackings*			

Testing according to SFS 4261

1	*Checking the working pressure*			
2	*Load test with maximum allowed load*			
3	*Checking all of the movements to the limits*			
4	*Checking the function of relief valves*			
5	*Checking the function of stabiliser safety valves, anti-cavitation valves; hose burst valves*			
6	*Condition of main structures after testing*			
7	*Tightness of the hydraulic system*			

NOTES

Next inspection to be done latest on	*Inspected by*	*Date*

KESLA OYJ

CERTIFICATE OF WARRANTY SERVICE

Customer	*Loader model*	*Serial no.*
Sold by	*Fitted by*	*Fitting date*

Warranty Service must be carried out within 30 days from fitting and commissioning of the loader. Failure to complete the Warranty Service will end the Warranty Period of the loader at 30 days from assignment to the customer. This certificate must be filled by the Service Centre and copies must be given 1st to the customer, 2nd to the Distributor of the Loader and 3rd remains with the Service Centre.

To be inspected before testing the loader		*Checked*
1	*Tightening of the stabiliser beam bolts and fitting bolts of the loader*	
2	*Locking of the pins*	
3	*Attachment of the grapple and the rotator*	
4	*Attachment of the steps and the top seat*	
5	*Attachment of the hydraulic pipes and connections of the hydraulic hoses*	
6	*Oil leaks*	
7	*New pressure and return filters*	
8	*Amount and quality of hydraulic oil; slewing gear oil*	
9	*Function of control levers; Movement of spindles; Returning to neutral position*	
10	*Inspection of double extension chains; tightening if needed*	
11	*Full lubrication of the loader including the stabiliser control cables*	
12	*Safety decals, Safe Working Load plate; CE plate (loader and vehicle)*	
13	*Service training for the operator*	
14	*User's/Service Manual is with the loader*	

Testing

1	*Driving all of the movements to the limits with load*	
2	*Checking the working pressure and the back pressure*	
3	*The booms stay up; no internal leakage*	
4	*Pressure relief valves operate correctly*	

Inspections after testing

1	*No hydraulic oil leakage*
2	*Temperature of hydraulic oil stays normal*

REMARKS

Place	*Fitted by/Signature of the Fitter*
Date	*Accepted by/Signature of the Customer*